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ABSTRACT

A program referred to as Language Skills Computer Assisted Instruction (LaSCAI) was chosen to assist volunteer tutors in improving the reading skills of adults. The program was demonstrated at two libraries--one rural and one urban--and an evaluation was completed to determine its applicability in enhancing the on-going tutoring programs at these sites. Prior evaluations had shown that LaSCAI does improve functional reading ability, so the main focus of the library demonstrations was to determine the value that the tutors and students placed on the LaSCAI program. The qualitative evaluations consisted of pre- and post-interviews with students and tutors to reveal their attitudes toward literacy, tutoring, computers, and the LaSCAI program in general. Results of this evaluation indicate that the program should be very successful when integrated properly into the adult literacy programs in current use in libraries. Specific conclusions are: (1) the LaSCAI program can be used to advantage in a library setting using microcomputers and volunteer tutors to raise the reading level and increase the literacy retention of adult students; (2) a certain amount of program modification, revision, and documentation is still required to extend this program to other libraries without extensive personnel support; and (3) a single source is needed to administer the application of this program for other libraries, to serve as a clearinghouse for subject matter prepared on disks, and to obtain resources and direct continuing research and development needed to improve and expand the use of the program. (Author/THC)

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TECHNOLOGY TRANSFER REPORT

Technology Transfer of a Reading Skill Improvement Program for the National Commission on Libraries and Information Science (NCLIS)

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PREFACE

The contents of this paper were prepared by the various authors with the US Army Human Engineering Laboratory providing the project support and coordinating and consolidating the work presented herein.

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ABSTRACT

A program referred to as Language Skills Computer Assisted Instruction (LaSCAI) was chosen among many techniques to provide a tool to assist volunteer tutors to improve the reading skills of adults. This program was demonstrated at two libraries and an evaluation completed to determine its applicability in enhancing the on-going tutoring programs at these sites.

Since prior evaluations have shown that LaSCAI does improve functional reading ability, the main focus of the library demonstrations was to determine the value that the tutors and students place on the LaSCAI program. The qualitative evaluations consist of pre-and post-interviews with students and tutors to reveal their attitudes towards literacy, tutoring, computers, and the LaSCAI program in general. Identification of any problems using the LaSCAI program in different environments was also an area of interest.

Results of this evaluation indicate the program should be very successful when integrated properly into the adult literacy programs in current use in libraries. Specific conclusions are:

1. The LaSCAI program developed by the Navy R&D Center can be used to advantage in a library setting using microcomputers and volunteer tutors to raise the reading level and increase the literacy retention of adult students.

2. A certain amount of program modification, revision and documentation is yet required in order to extend this program to other libraries without extensive personnel support.

3. A single source is needed to administer the application of this program for other libraries, to serve as a clearinghouse for subject matter prepared on disks, and to obtain resources and direct continuing R&D needed to improve and expand the use of the program.

The NCLIS should recommend using the selected reading skill improvement program (LaSCAI) by libraries and literary organizations and locating the single source required to implement the program.

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TECHNOLOGY TRANSFER OF A READING SKILL IMPROVEMENT PROGRAM FOR THE NATIONAL COMMISSION ON LIBRARIES AND INFORMATION SCIENCE (NCLIS)

I. INTRODUCTION

The National Commission on Libraries and Information Science, in an effort to provide volunteers and libraries with a tool to use in the work to eliminate adult illiteracy, asked the US Army for assistance. Transferring federally-developed technology to the public and private sectors is provided for in the Stevenson-Wydler Act, Public Law 96-480.

The US Army Human Engineering Laboratory, a member of the Federal Laboratory Consortium, responded and shared its resources with a steering committee. The committee selected a computer-assisted reading program for transfer, and demonstrated and evaluated an application of the program in two libraries.

II. BACKGROUND

The National Commission on Libraries and Information Science (NCLIS) has long been concerned with the fact that illiteracy is a major barrier to an individual's access to information. In keeping with its legislative mandate, the commission intends to work toward the elimination of this barrier by promoting the use of public libraries for adult literacy education.

According to the Department of Education, approximately 23 million adults are functionally illiterate, and this number is growing by 2 million each year. In terms of cost, it is estimated that the yearly expense to the government because of illiteracy is $6 billion in welfare and unemployment compensation and $6.6 billion in prison costs. In 1979, the White House conference on Libraries and Information Science confirmed that the US literacy rate is lagging behind those of Europe and the Soviet Union.

The NCLIS has stated as its major goal:

> To eventually provide every individual in the United States with equal opportunity of access to that part of the total information resource which will satisfy the individual's education, working, cultural and leisure-time needs and interest, regardless of the individual's location, social or physical condition, or level of intellectual achievement.

In order to help achieve these goals, the US Army Human Engineering Laboratory (USAHEL) was contacted regarding the transfer of related technology in accordance with the Stevenson-Wydler Technology Innovation Act of 1980 (Public Law 96-480).

The USAHEL established a steering committee to plan a project to transfer federally-developed technology that would give volunteers and others a tool to use in cooperation with libraries and information service facilities. These volunteers would apply the transferred technology to help individuals who have basic reading skills below the sixth grade level.

The steering committee consisted of a representative from the following groups:

- Literacy Volunteers of America
- Literacy Learning Resource Center, Enoch Pratt Free Library, Baltimore, Maryland
- Army Research Institute for Behavior and Social Science
- Delaware Technical and Community College
- US Army Human Engineering Laboratory
- National Commission on Libraries and Information Science
- Mary H. Weir Library, Weirton, West Virginia

One of the committee's first steps was to conduct a literature search of the adult learning programs developed by federal R&D laboratories. Some of the programs examined included:

- Functional Literacy (FLIT)
- Hand-Held Vocabulary Tutor
- Language Skills Computer Assisted Instruction Packet (LaSCAI)
- Basic Skill Education Program
- Interactive Videodisc Systems
- Science Reading Laboratories, SRA Series
- TRIADS (Tri-Service Computer Group)

Upon considering the number of illiterate adults compared to the number of literacy volunteers, the initial and operation costs, and most importantly, the success rate of each program, the LaSCAI Packet was selected. The LaSCAI is a computer-assisted instruction (CAI) program developed by Drs. Robert Wisher and Thomas Duffy at the Navy Personnel Research and Development (NPR&D) Center, San Diego, California. More than 1000 students have used this program and it is currently in use by the Navy at their Operations Specialist "A" school and the Baltimore County Public School System.

Prior to current use by the Navy at the Operations Specialist school, the LaSCAI program was originally used with a group of students at the NPR&D Center, using 12 Apple IIe microcomputers and Pascal software. These students were given the Gates-McGinitie reading test and those which were below the 12.0 reading grade level were randomly placed in three groups. One group received no remedial reading assistance, one group received traditional teacher-student training, while the third group used the LaSCAI program.

When these three groups then went through the specialist training program at the OS "A" school, the attrition rates for the three groups were as follows:

Group 1 - No remedial training (18%)

Group 2 - Traditional training (16%)

Group 3 - LaSCAI training (12%)

Student and supervisor reaction to the LaSCAI approach was very positive. Also, more of the LaSCAI trained students graduated with honors, which is significant since these students were originally chosen since they were in essence poor readers.

The following are some of the advantages of the LaSCAI packet:

1. An evaluation of naval personnel using the program has revealed a faster learning rate and longer retention for the LaSCAI students than for those taught by a person in a classroom.

2. The program can be tailored to teach reading and vocabulary in any area of interest. Each program can also be expanded to include as much information as desired.

3. Being a computer aided instruction (CAI) program, more students could be handled without increasing a library's staff, number of volunteers, time required, or resources.

4. The program currently runs on an Apple IIe computer which is within reasonable cost for public libraries. The program can also be modified to run on other microcomputers.

The LaSCAI packet consists of an instructional program, an instructor utility program, a formatter utility program, and a user's manual. Appendix C describes these in more detail. The instruction program is divided into three modules which repeat unless otherwise specified. The vocabulary module consists of two exercises dealing with the spelling and meaning of the vocabulary words. The comprehension module contains three reading and comprehension exercises on the paragraphs in the database. The techniques used in the module are based on research and development done at the Naval Personnel Research and Development Center. The last module is a test on the vocabulary words.

III. DEMONSTRATIONS

In November 1983, Drs. Wisher and Duffy held a workshop at the Perry Hall Senior High School, Baltimore County, Maryland, to demonstrate the LaSCAI program. The workshop included information on the research behind and development of the program and a hands-on computer demonstration. Following the workshop, the steering committee decided to hold two demonstrations. The goal of these demonstrations was to find the problems which arose as volunteer tutors used LaSCAI with their students and to formulate strategies for dealing with those problems.

The LaSCAI program was then made available to two library sites. One was at a branch library, serving an urban area, in a major eastern city (Reading Resource Center of Enoch V. Pratt Free Library in Baltimore, MD); the other was at the main library, serving a predominantly rural area, in a small eastern, industrial town (Mary H. Weir Library in Weirton, WV). Both sites volunteered to participate and both sites had or acquired the necessary computer hardware. The Pratt Free Library chose consumer awareness as its subject area. The Mary H. Weir Library chose money management and information on their concepts and planned implementation is in Appendix B.

The software was introduced in the context of a demonstration--not an experimental--project. That is, neither the library nor the tutors were told how to use the program--that was entirely up to them. The program was made available under the agreement that they would "work with it" over the ensuing four months.

Consistent with the notion of a prototype demonstration, the software was introduced in a half day workshop in which the program was demonstrated, the philosophy of the program described, and the requirements for generating words and paragraphs explained. After the workshop technical representatives were available to answer questions about how the program worked and to provide editorial comment on materials developed.

IV. EVALUATION OF DEMONSTRATIONS

We began the design of the evaluation by assuming that if LaSCAI could be implemented in library-sponsored literacy programs, it could benefit them in at least two ways: (1) it could improve the efficiency of the program by allowing the available tutors to serve more students and (2) it could increase the motivation of the students to participate in literacy training

Our main concern in the evaluation was to find the problems that arose with implementing LaSCAI in the library settings and if possible, formulate strategies for dealing with them. We were not there to evaluate the effectiveness of the software since evaluations had already been carried out (Duffy and Hartz, 1984; Wisher, 1983; Thorstead, 1985) and a proper software evaluation would require a larger, experimental context rather than the small, demonstration context. The small, uncontrolled nature of the project at each library site also prohibited a comparison across sites. Thus our focus was very much problem identification in the sense of formative evaluation procedures (Dick and Carey, 1985).

Although we allowed the evaluation to be driven by the problems that actually arose at the sites, we began the evaluation plan by anticipating some of the difficulties and designing the evaluation to address them. Specifically, we isolated three potential problem areas for generalizing LaSCAI to community literacy centers:

1. The volunteer tutor at the site might not accept the technology and might fail to cooperate in implementing it.

2. The center might not use LaSCAI in a way that actually improves efficiency. This might happen because:

   o The tutors might not be able to generate appropriate content materials (units) for the program.

   o The tutors might not use the program with their students in ways that increase efficiency.

   o The theory that underlies LaSCAI might be incompatible with the center's approach to teaching reading.

3. The students might not accept the technology and might resist or refuse involvement with it.

Both demonstrations were evaluated quantitatively as well as qualitatively. For the quantitative evaluations, the students' pre-test and post-test scores were compared. Both tests entailed a standardized test of reading ability (ABLE) and a functional literacy test on the library's chosen topic. These test scores were then compared with test scores from students who received regular tutoring sessions.

The methodology and results from the evaluation are included as Appendix A.

V. CONCLUSIONS

Results indicate that a federally developed program (LaSCAI) should be very successful when integrated properly into the adult literacy programs in current use in libraries. Specific conclusions are:

1. The LaSCAI program developed by the Navy R&D Center can be used to advantage in a library setting using microcomputers and volunteer tutors to raise the reading level and increase the literary retention of adult students.

2. A certain amount of program modification, revision and documentation is yet required in order to extend this program to other libraries without extensive personnel support.

3. A single source is needed to administer the application of this program for other libraries, to serve as a clearing house for subject matter prepared on disks, and to obtain resources and direct continuing R&D needed to improve and expand the use of the program.

VI. RECOMMENDATIONS

The NCLIS should recommend the use of the selected reading skill improvement program by libraries and literary organizations and locate the single source required to implement the program.

APPENDIX A

Methodology for the LaSCAI Demonstrations & Evaluation

METHODOLOGY

INTRODUCTION

The federal government passed the Educational Opportunity Act in 1964 to provide funds for basic education and literacy instruction for out of school adults. Thus the government has long recognized adult literacy as an issue of national concern. However, it is only recently that the "problem" of adult illiteracy has been brought to the forefront of national attention. This has been accomplished through the direct efforts of the White House Adult Literacy Initiative (Office of the Press Secretary, 1983), through a multimillion dollar advertising campaign jointly sponsored by business and the federal government (Mark, 1983), and through a recent book by Jonathon Kosol, Illiterate America.

What is the size of this problem? Early assessments and surveys have estimated that 20 to 25 million adults are functionally illiterate (Adult Performance Level Survey, 1976: Harris, 1970-1971). The Department of Education (1983) has projected, based on population growth, that there are likely more than 74 million functionally illiterate and marginally literate adults today. These are adults who have difficulty reading materials required for day to day functioning in our society. While these are the most often cited estimates, there are numerous other estimates using different criteria or different level of the same basic criterion (Harmon, 1984); Nickerson, et al., 1985). The important point is that they all indicate a very large number -- a number deserving of national concern and a national response.

The size of the "Functionally illiterate" population in the United States is perhaps surprising given our self image of schooling and literacy. Indeed, in the academic realm issues of "literacy" are worlds beyond the day to day survival requirements; the focus is on precision of language and argumentation -- the pleasures of language. Yet, for an estimate one fifth of our population printed language is an obstacle to survival and growth. Consider the literacy demands the other four fifths of the population takes for granted but are essential information sources -- reading traffic signs, advertisements, packages in the grocery store (imagine the difficulty of the nonreader attempting to purchase the lower cost generic products in the supermarket), the Bible, notices from school and the various federal agencies, job forms. The inability to decode these materials, and the fear of anyone's discovering that fact, has devastating consequences for the individual's self image and feelings of self worth.

The implications for the economy are clear. The U.S. Department of Labor estimates people lacking basic reading and writing skills account for about 75% of the unemployed (Toch, 1984). Consider the difficulty in finding a job when one lacks the literacy skills to read the want ads or fill out an application form. While individuals lacking adequate reading skills do in fact find employment, the inability to meet the literacy demands on the job may affect productivity and safety (Sticht, 1975; Duffy, 1985). Seventy-five percent of insurance companies responding to a survey indicated that basic skills deficiencies inhibit promotion of entry-level high school personnel which in turn leads to decreased productivity, lowered morale, and increased turnover (Henry, 1982). Low literacy is also strongly related to crime. An estimated 85% of juveniles brought to juvenile court are illiterate (Adult and Continuing Education Today, 1983) while 60% to 80% of prison inmates are illiterate (Boorstin, 1984).

Current estimates indicate that only 4% of functionally illiterate adults attend instruction. Thus, the advertising campaign and the adult literacy initiative have the potential of greatly expanding literacy instruction efforts. However, unless there are adequate instructional resources available, the campaign could also serve to alienate potential students. If adults respond to the advertising and take the major step of seeking instruction, then there most certainly must be an instructional program available.

There are currently over 5,500 different agencies offering instruction (Kudavy, Moore, and Hunzecher, 1983), but most of those are small groups at the community level. In the past, the number of agencies was adequate to meet the instructional demands. Indeed, there had been concern over the failing enrollments (Russ-Eft, Rubin, and Holmen, 1981). However, today it seems that, even without the advertising campaign, the demand is greatly outstripping the available resources. McCune (personal communication) reports that in the State of California the request for adult basic skills instruction exceeds the capacity by 1,000 people per week. Thus in one state alone there are 52,000 people per year who must be turned away from, or put on a waiting list for, adult basic education. In 1981, 100,000 adults were on the waiting lists in Illinois (The Chicago Reporter, 1983). Volunteer tutoring programs which focus on beginning reading skills report similar strains on their capacity. While there are 1,200 Laubach tutors in the state of Washington, there is still a month-long wait for tutoring (Seattle Post, 1983). Block (personal communication), reports that the 100 Laubach tutors in Pittsburgh, PA have a waiting list of 300 students. Statistics at all levels of reporting yield the same message -- the demand for literacy instruction is far exceeding the supply. The increasing national awareness, discussed earlier, will exacerbate these shortages unless some mechanism is found for increasing the availability of instruction.

Libraries have played an active role in the adult literacy efforts, providing facilities, resources, and administrative support for the conduct of literacy instruction (Casey, 1972). Recently, the Librarian of Congress called on the libraries as well as Federal agencies and the private sector to increase their efforts in order to abolish illiteracy in this country by 1989. The National Commission of Libraries and Information Sciences (NCLIS) launched this project as part of the continuing involvement of the libraries in adult literacy efforts and in recongition of the need for more effective and efficient instruction to meet the growth in the demand for instruction.

A goal of the NCLIS project was to link computer-based and tutor based instruction as a means of achieving efficiency. Both tutor and computer provide individualized instruction, which some see as essential in the heterogeneous world of adult literacy (Knowles, 1978; Cook, 1977; Duffy and Bowen, in preparation). However, the computer-based instruction requires human support for counseling and most likely for other components of instruction. Furthermore, as discussed above, there are an inadequate number of tutors to meet the demands. Thus, the use of computers to augment the tutor instruction may permit tutors to reach a larger number of students.

Tutoring programs are frequent users of library resources and thus it is natural for the NCLIS to turn to the group. Other groups providing instruction are primarily represented by the community college and secondary schools funded through the Adult Education Act. Most tutoring programs have several common characteristics. First, and most obviously, they provide individualized instruction, one-on-one tutoring. Second, they focus on the lowest level readers, those reading at the zero to fifth grade level. Third, the programs are nonprofit, with most personnel, including the tutors, being unpaid volunteers. Basically, the tutor programs recruit volunteers from the community, provide a minimal training program (generally 116 to 20 hours of workshops), and then link the tutor to a student. The two national groups--Literacy Volunteers of America and Laubach Literacy International--had a total of 41,000 volunteers who worked with 67,000 students during 1982 (Mark, 1983).

While the goal of the NCLIS project is to give the tutor a new tool which will permit the tutor to reach more students, there are numerous other potential benefits of using computer-based instruction (CBI). Evaluations of CBI most typically indicate that learning is more efficient than in teacher based instruction. We would expect this to be particularly true in conducting drill and practice exercises in reading. Thus, the use of CBI may lead to more rapid progress in the growth of reading skills.

Additionally, the CBI may provide a stable structure for a program of instruction. As we discussed previously, tutors receive minimal training. Furthermore, except for Laubach instruction, the tutor is responsible for creating an instructional program. In this context, the tutor may find fixed guide posts useful. Fourth, it could increase the student motivation for participating in literacy instruction. For many students the opportunity to work with a computer is very appealing. Finally, the use of CBI increases the privacy of instruction. A human is not required to tell the student of his or her error.

THE NCLIS PROJECT

The requirements for, and potential benefits of, introducing computer technology into adult literacy tutoring was to be determined through the evaluation of two parallel demonstration projects. In the demonstration projects, the software would be made available to particular libraries, along with guidance for its use. Evaluators would observe the use of the software to identify factors which contributed to effective or ineffective use.

Obviously, not all computer technology could be evaluated -- a particular program or set of programs had to be selected. That program, NCLIS decided, should be instructionally sound and appropriate for adults. Thus NCLIS had as an initial, critical task to survey existing CBI to determine the programs most appropriate for use in the library, volunteer tutor programs. Basically the program had to have the following characteristics. First, it had to be low in cost. Adult education programs are notoriously underfunded and thus any program selected must be inexpensive. Second, the program must run on the computers available in the library and adult education programs. These are generally the inexpensive micro computers, e.g., Commodore and Apple II. Third, the program materials must be appropriate for adults -- the materials could not be designed for children nor could they simply focus on decontextualized reading skills, e.g., reading nonsense syllables. It is essential that adults see the relevance of the instruction they are receiving -- instruction is voluntary and instruction which is seen to be irrelevant or degrading will not be tolerated.

The above three requirements were mandatory. It would simply be unreasonable to introduce a computer program which did not meet the cost or relevance criteria of adult instruction. A fourth criterion, flexibility, was desirable, although not essential. Perhaps the most salient characteristic of adult literacy instruction is the diversity. Students range widely in reading skill level -- from 0 to 6th grade in the adult programs. Furthermore, the students' goals for reading -- and hence the relevant content -- varies widely. Finally, the belief structure of the tutors and teachers as how to best meet the student needs varies widely. Thus it would be most desirable to identify a program which was maximally flexible in the content domain and in the difficulty level of the materials presented.

NCLIS identified a program developed by the Navy as meeting not only the first three criteria but also the fourth criterion. That program, the Language Skills Computer Assisted Instruction (LaSCAI) was developed as part of a Navy research and development project and evaluation data as to the effectiveness of the program was already available (Leopold and Wisher, 1984; Duffy and Hartz, 1984). The program was demonstrated to NCLIS by the Army and was made available by the Human Engineering Laboratory through the Stevenson-Wydler Act, a bill which encourages the transfer of technology from the federal government to local governments and private industry. Also under the auspices of the Stevenson Wydler Act, the Army Human Engineering Laboratory provided both financial and management support for the initiation and evaluation of the demonstration project.

LaSCAI

Theoretical perspective

The LaSCAI program is based on a generative model of the reading process. In such a model, written language is viewed as a string of symbols (Wisher, 1983). Reading comprehension is the task of decoding this symbol string into an internal representation, which is the "object" that a reader comprehends. This "object" has been popularized by a variety of names in recent years, most notably by the term "schema" (Rumelhart, 1980). Schemas prepare a reader as to what he or she is likely to encounter in a written passage. There is a growing awareness, then that comprehension is a complex mental and linguistic process in which the reader is actively involved in developing hypotheses about upcoming text (Goodman, 1973). These hypotheses span a range of linguistic levels, and research suggests that, even for children, reading is partly a generative process. Weber (1973), for example, has shown that substitution errors of first graders during oral reading were more strongly controlled by the syntactic and semantic constraints of the text than by the graphemic form of the mistaken words. In adult readers, Wisher (1976) demonstrated that the accurate anticipation of syntactic form reduced processing load. In order to reckon with this top-down influence, Rumelhart (1977) developed an interactive model of reading that took into account the extra-textual sources of information that a reader uses. Efficient decoding of the symbol string depends on a reader's faculty for top-down processing.

Readers regularly generate hypotheses influenced by syntactic and semantic cues during reading and those hypotheses are immediately accepted or rejected on the basis of information sampled from the test (Smith, 1973). Indeed, skilled readers are not aware of their active interaction. Among adult readers of varying ability, Frederiksen (1980) demonstrated a close relationship between a subject's ability to use context in encoding phrases and reading ability. Less-skilled readers are not as able to generate accurate hypotheses about text.

Reading instructors have acknowledged the usefulness of students' formulation hypotheses about upcoming text (Schell, 1972), but the contribution of such activity to the reading classroom has been primarily limited to the cloze procedure. Cloze is a method in which selected words deleted from a passage are replaced by the student. Completing a cloze passage is a thinking activity involving the proper identification of linguistic cues embedded in the context surrounding the deletion, and has achieved wide success in the reading classroom (see Tierney, Readence & Dishner, 1982 for a review). Perhaps the strongest virtue of the cloze procedure is that it forces students to think about the structure and meaning of text. The cloze procedure has been used in computer-based approaches but in most cases the computer merely initates which could be done with a book.

Instructional approach

Students using LaSCAI work through a series of learning units, each of which consists of ten vocabulary words to be learned and two paragraphs with reading comprehension exercises.

LaSCAI's vocabulary instruction emphasizes attention to and memory of the components of the word and definition. The student first sees the word in a context sentence. Next the student types the word while it is displayed on the screen. The student then must type the word from memory. After completing the word exercises, the student studies the definition. When he thinks he knows it, the definition is removed and a test is administered. The test requires reconstructing the definition in a multiple-choice format. The first word is presented and the student chooses the next word. The third word is then selected from a new multiple-choice listing, and so on until the definition is completed. If more than two errors are made in this part of the exercise, the definition is represented. Additionally, the word is represented for relearning at the end of the vocabulary lesson.

The design of LaSCAI's paragraph instruction is based on the linguistic expectations that appear to play so strong a role in skilled reading comprehension. Within each sentence, a reader may anticipate in a word by word manner what is about to be read. Consider the problems that paper and pencil instruction would be confronted with if it attempted to include this dynamic phenomenon in its approach. Where would one begin? The computer, on the other hand, is an apt tool to capture this important aspect of reading due to its capability for manipulating symbol strings.

Three instructional exercises were developed, each of which addressed the notion that successful reading depends on a reader's ability to generate expectations about the structure and meaning of text. All three exercises require the student to use syntactic and semantic cues in the paragraphs as well as memory of the paragraph from when it was read at the beginning of the sequence. The intention was to create an environment in which students could develop some of the generative skills that good readers have mastered.

1. Sentence arrangement. This exercise requires the student to construct a sentence from a controlled set of words and phrases. Distractors are drawn from other sentences that appear in either the target or a related paragraph, with the constraint that the distractors be orthographically similar to the correct word or phrase. Essentially, the student builds a sentence. The purpose is to force the student to deal with syntactic and semantic constraints in devising a sentence.

2. Paragraph organization. The task is to arrange a set of sentences into meaningful order, as they appear in the target paragraph. This exercise forces the student to assemble and sequence ideas into a larger logical unit, paying special attention to references between sentences and introduction of topics. The intention is to force the student to anticipate and exercise the constructive process in comprehension (Spiro, 1980).

3. Missing word. This is the cloze procedure previously discussed. Sentences appear individually with a word missing. The task is to select the proper word from among a controlled set of distractors. This exercise is similar to the sentence arrangement task, but imposes more constraints within the sentence for the student to consider.

The student either reads the paragraph first and then proceeds with the three exercises in various orders or first engages in one or more of the exercises before reading the paragraph as a whole. The latter case especially forces the student into a generative mode since he or she cannot rely on memory for the paragraph.

LaSCAI allows literacy instruction to be individualized. The program units (10 words and 2 paragraphs each) may be devised from any content area, so LaSCAI's use may be geared to the reading needs and interests of particular students. An unlimited number of units may be developed for LaSCAI and stored on diskettes.

Summary.

In essence the program can be adapted to any level reading skill as long as the student has some basic decoding skill (1st or 2nd grade reading skill). Furthermore it can support any tutor curriculum in terms of the subject matter of instruction. The program appears to be ideally adaptable to the adult education world.

METHOD

PARTICIPANTS

Tutors

There were seven rural and 10 urban tutors when the project began. All were recruited by the respective libraries and volunteered to be part of the "computer demonstration" project. The tutors in the project were all "experienced" tutors, having tutored previously and having been trained in the particular libraries tutoring programs. The rural tutors had undergone a Laubach Literacy Int tutoring workshop of 10-12 hours. The Pratt tutors had undergone training based on Literacy Volunteers of America materials.

Laubach and LVA both emphasize a phonics approach to reading. A primary difference in the programs has to do with the selection of materials for the students. Laubach has a highly structured curriculum employing four basal readers. Thus reading material, exercises, and the sequence of instruction is highly prescribed for both tutor and student. In contrast, LVA emphasizes designing reading instructions to meet the reading goals of the student. Thus, material and exercises are created by the tutor for the student. This "creation" may simply involve selecting materials from an LVA library or it may involve selecting relevant materials from the environment.

Students

There was one student assigned to each tutor. As with the tutors, all of the students volunteered. At the rural site, the tutor and student had been working together before the demonstration project. Thus the use of LaSCAI is simply a new component to an existing tutoring arrangement. The urban site chose to begin new tutor-student relationships for this project. Thus while the student may have been receiving tutoring in the past (and the tutor may have taught before) this project was the beginning of a new instructional program.

DESIGN

The evaluation, like the demonstration project, proceeded in two stages.

Stage 1: LaSCAI curriculum development.

The strength of the LaSCAI software is that the instructional materials can be tailored to the specific needs of the literacy program and the particular student. This strength of the software, however, results in increased teacher responsibility. That is the teacher/tutor must first identify the subject matter or content domain that should be used with the student and then must develop particular vocabulary, definitions, and paragraphs to be used in the instruction. The strategies that the tutor's had in carrying out these tasks were the focus of the first stage of the evaluation.

The evaluators observed the workshops that were provided to introduce the LaSCAI program and they conducted small follow-up workshops to assist the tutors. It was through the observation and participation in these sessions that the evaluators were able to identify tutor strategies and problems in identifying content domains.

The evaluators also offered to enter the curriculum materials, which were developed by the tutors, onto the LaSCAI program. The evaluators also offered to provide editorial feedback on the materials to provide the tutors with an opportunity for revision. Thus, we could review the database (words, definitions, and paragraphs) as it was initially submitted by the tutors and we could assess the effects of editorial feedback on subsequent submissions.

We recognize that significantly more help was available to these tutors then would be available in future implementations. However, the goal of the evaluation is to identify the problems and the help can aid in guiding future decisions as to just what instructions and how much practice should be provided to tutors and whether those instructions require a workshop or could be provided in a manual.

Stage 2: Instruction

There were three parts of the instructional stage: pretesting, delivery of the instruction, and posttesting.

The pretests consisted of extensive interviews of tutors and students, along with objective tests of the students' reading performance using ABLE.

The delivery of the instruction included the completion of ten units of computer-assisted instruction by each student. Selected tutor-student pairs were observed during this period.

The posttests consisted of follow-up interviews of tutors and students as well as objective testing with the ABLE reading test.

PROCEDURE

The tutors were provided a one day workshop on the use of the program. The workshop included a demonstration of the program, an explanation of the philosophy underlying the program, discussion of strategies for developing units of instruction, and discussion of ways to integrate the computer instruction with the regular tutoring. The discussion on developing units of instruction included consideration of alternative content domains, sources of material (real world reading materials in that domain), and guidelines for selecting and writing words and paragraphs. The latter included limitations in the program (e.g. no more than five, 22 word sentences per paragraph), as well as potential pedagogical problems to watch for in designing materials (e.g. paragraphs lacking coherence, definitions more difficult or more abstract than the word being defined, and text that is syntactically or semantically too difficult for the students).

The workshop was not designed to tell the tutors how they should use the program, rather it was geared to making clear the limitations and capabilities of the system and to open discussion on possible uses. All decisions on content and on instructional approach were made by the tutors and/or the library administrators.

After the workshop, the tutors decided upon a content domain and submitted three units of material to the evaluators for editorial feedback. Detailed feedback, including both general problems and specific changes that should be made, was provided. Using that feedback, the tutors developed the final version of their materials, ten units at each site,and submitted them to be recorded onto diskettes.

Tutoring using the LaSCAI program began as soon as the materials and the computers were available. Meetings were held at the library. There were one to two one-hour meetings scheduled each week and the meeting was structured by the tutor (sometimes with the assistance of the library coordinator).

The pretesting and posttesting were scheduled by the library coordinator directly with the student or tutor. The pre and post tests were private and were conducted at the library.

The evaluators observed tutoring sessions during the last half of the demonstration project. Because of the irregular and unreliable scheduling of tutoring sessions, as well as the travel time involved (60 miles and approximately 450 miles) it was not feasible to develop a systematic observation plan. Rather, we chose days on which at least two tutoring sessions were normally scheduled and requested that additional tutor-student pairs try to switch to those days for that particular week. We attempted to observe computer sessions as well as noncomputer sessions. If a tutor alternated days -- one time using the computer the next using traditional instruction -- we attempted to observe that tutor in both types of sessions. Otherwise we simply observed another tutor-student pair, where the tutor had similar training to the rest of our group and the student could at least decode simple words.

The evaluator sat behind and to the side of the tutor student pair during the observation session so that she could observe the use of the computer (or work sheets) and hear the instructional dialogue. The observer introduced herself, indicated that she was interested in what happened during a tutoring session, and requested that they simply proceed with their tutoring session as they normally would.

TEST, INTERVIEW, AND OBSERVATION MATERIALS

INTERVIEWS

Tutors and students received structured interviews at both the beginning and the end of the project. Each interview lasted approximately 50 minutes and consisted of a series of open ended questions.

The first tutor interview began with the collection basic demographic information: age, sex, prior teaching experience, prior tutoring experience, and length of residence in the area. The interview then probed the tutors attitude toward computers in society -- are they useful, can they be harmful, would/do "you" use one. This question area also probed the tutors ability to integrate new technology into their existing routines -- a very important consideration in introducing computer based instruction. The next section probed the tutors understanding of the reading process and approach to reading instruction. The questions asked about typical exercises the tutor used, the "best" exercises, and a rationale for the pronouncements. It also asked the tutor to talk about the main activities involved in reading and what problems most students have. This question series included questions about their understanding of the tutoring approach they were taught (Laubach or LVA) and solicited comments on the strengths and weaknesses of the tutor training. The next series of questions asked the tutor to discuss the particular student he or she was tutoring in terms of perceived motivations, likelihood of success, definition of "success" and specific reading problems. The final series of questions probed the tutors understanding and acceptance of the LaSCAI program including how they thought they would use the program, e.g., separate or as a part of the rest of the tutoring; with the student working alone or under the tutors guidance.

The tutor interview following the demonstration was similar to the first interview except: demographic questions were dropped and questions concerning how the LaSCAI program might be improved were added.

The student interview began with demographic questions like those for the tutors and had the same basic topics. However, there was much greater emphasis on identifying the students understanding of reading and his or her goals for reading, and instructional goals beyond the tutoring program. Questions concerning strategies for using LaSCAI were eliminated and there was much less emphasis on the attitude toward technology in general.

Literacy tests

The students were pre- and posttested with the Adult Basic Learning Examination (ABLE) at Levels 1, 2, and 3 (Karlsen, et. al., Harcourt Brace Jovanovich, Inc., 1967). The test is untimed and consists of a series of paragraph comprehension tests. The test is one of the most strongly recommended for assessing adult reading skills. Because the sample was so small, and the interval between testing was at least four months, the same form of the test, Form A, was used for both pre- and posttesting.

RESULTS

DEMOGRAPHIC DATA

Tutors

The tutors at the two sites had very similar characteristics. Ages ranged from the early twenties to the early 70's, with a median age of 39 at the rural site and 44 at the urban site. The rural tutors were all female, while only 5 of the 7 urban tutors were female. This distribution of ages and sex is similar to that reported for other tutoring programs (Lane, 1983; Stauffer, 1973).

All of the tutors were experienced in tutoring before the start of the project, having tutored at least one other student. The range of time spent tutoring ranged from .08 years to approximately 4.0 years. The median length of experience was 1.35 years at the urban site and 122 hours at the rural site. (The rural site recorded tutoring experience in terms of tutoring-hours, not years of involvement with the tutoring program). Two of the urban tutors also had prior teaching experience, one in both a high school and a college, one in a vocational training program. Two of the rural tutors also had previous teaching experience in a school, one in a junior high school, the other in a school of nursing.

Students

Students at the two sites were similar in age. The age range was from 20 to 50; the median age was the late twenties. Nine students were female; five male. At the rural site, 50% of the students were female, while at the urban site, 84% were female. All but three of the rural students were native language speakers. The three non-native students were from Yugoslavia, Korea, and Thailand.

The students had all lived in the area at least two years, with medians of 11.1 and 6.6 years at the rural and urban sites respectively. A third of the urban students indicated they had lived in the area "on and off" during the time, thus suggesting a more mobile urban student group.

The rural students had been involved in the Library's tutoring program significantly longer (8.3 vs 4.5 months) than had the urban students. Eighty-five percent of the students in the rural program had participated in the Library's tutoring program for four months or more; 12.5% were new to the tutoring program. At the urban site, 83.3% of the students were new to the tutoring program; 16.7% had participated the previous year but had quit. This difference reflects the fact that the rural library offered the opportunity to participate in the program to existing student-tutor pairs while new pairings, and hence new students, were the focus of the urban program. However, the urban students were not new to adult education --66.6% of these students said they had attended other tutoring or adult education programs, including tutoring at another library, a GED course, adult extension courses, and a community college program. At the rural site, only 25% of the students said they had attended other adult education courses. These were a GED program and courses at a business college.

Students at both sites were given the ABLE reading test, Level 1, 2, or 3 as a pretest. The grade level scores ranged from 1.3 to 9.0+, with median scores of 4.1 and 7.6 at the rural and urban sites respectively. (The urban library disqualified one of the students from the demonstration because her reading score was below the third grade level).

DEVELOPING INSTRUCTIONAL MATERIALS

The first phase of the project required developing the words, definitions, and paragraphs to be used in LaSCAI. This phase is critical to the success of the reading instruction since the appropriateness and the quality of the materials will in large measure determine the success of the program. There are two components to the phase; defining the domain for instruction and actually writing the words, definitions, and paragraphs. Both requirements were introduced in the initial workshop. Extensive discussion followed the workshop through both telephone conversations and mini-workshops.

Defining the Domain

In defining the domain, the tutors had to first select a subject matter and then identify typical reading materials within that subject matter. The tutors were to select subject matter that was relevant to daily life and of interest to the student. Once the subject matter is defined, actual materials must be selected as a source for identifying appropriate vocabulary and paragraphs. The strategy is to select materials: 1. which the student will actually encounter in his or her daily life (thus providing the opportunity for practice and transfer out of the classroom); and 2. which contains familiar concepts and terminology (so the student does not have to learn to read as well as learn a new content domain). In sum, the materials were to be conceptually familiar to facilitate the generation of meaning and hence the reading process; relevant so that they will be encountered and reading skill will be practiced outside of the classroom; and interesting and useful so the student is motivated to develop and apply the reading skills.

Both tutors and library staff attended the first workshop and shared in the discussion of the strategy for selecting materials. After that session, however, the two libraries proceeded very differently. The librarians at the urban site assumed full responsibility for defining the content domain, identifying relevant materials, and developing the words and paragraphs. The librarians focused on identifying materials that would meet the global needs of the neighborhood, i.e., would be of most interest and use to the area. They seemed to have little difficulty in defining those needs and selecting relevant material. Furthermore, the materials they focused on, did in fact seem appropriate for the area. The domains they selected for developing materials were "Preparing Your Income Tax Return", "Getting Your Driver's License", and "Consumer Protection". Furthermore, they did not have any difficulty in identifying materials commonly used in carrying out these tasks, e.g., "Rules of the Road", to serve as the primary sources for designing LaSCAI materials.

There appear to be two factors which greatly facilitated the domain selection activities at the urban site. First, the library plan was to begin the LaSCAI instruction with new student-tutor pairings. Thus the librarians could focus on the larger needs of the neighborhood, the abstract "clientele", rather than the particular needs of a small number of students. Second, the librarians had extensive experience managing and tutoring in the library literacy program. Therefore they could base their judgement on the experience with people coming to the library for help with particular tasks in which reading is central.

Identifying the content domain proved much more difficult at the rural site. There appear to be two reasons for this. First, the rural site was to insert the LaSCAI instruction into ongoing tutoring efforts. Thus, the focus became the interests and needs of those particular students. While this kind of individualization is ideal eventually, it is unrealistic at the start of a new program because of the labor and the coordination required to design 12 distinct sets of material. (Developing the first draft of a unit of instruction--approximately an hour's worth--takes an inexperienced person approximately 1.5 hours). Second, the tutors were given sole responsibility for determining the content domain. The consequence is, once again, a narrow view. A tutor has typically worked with no more than two students and thus only has those students as a frame of reference. Furthermore the tutors, as we shall see later in this report, have a limited understanding of the reading process. Thus they have difficulty in matching instructional approaches to the students needs.

Because tutors had both limited experience with students and limited training about the reading process, they had considerable difficulty finding an appropriate content area. These tutors found it difficult to agree among themselves on what students "should" or would want to read about. The tutors typically responded that their students simply wanted to "be better readers" or "pass the GED" or "read books and the newspaper". When there was some focus on a functional topic it was usually too specific to have any general applicability, e.g., chicken farming.

We initially felt the results were suggesting a difference between the prescriptive, goal oriented approach of the Laubach method versus the goal oriented tutoring of the Literacy Volunteers. Clearly, the rural, Laubach tutors were having difficulty with the notion of goal-oriented instruction. However, we found in the interviews (discussed later) that neither the Laubach nor the LVA tutors had a clear perspective on goal oriented instruction. In the interviews, the tutors were able to identify functional reading tasks their students performed and the gains they cited as most important concerned everyday reading tasks (clothing tags, newspapers). But they do not see functional content as essential for successful reading instruction. They, like the urban staff, held a general literacy model of reading (see Duffy, 1985). The content of the material is seen as little more than a motivational tool in teaching someone to read. So while they do not reject functional materials, they do not see them as necessary, either. As a consequence,they have no good heuristics for selecting content material for LaSCAI. In essence, the dimension distinguishing the rural and urban sites seems to be the breadth of focus in evaluating the problem much more than a particular mode of the reading process.

There was however some indication of a rural-urban difference which reflected the Laubach-LVA philosophies. This was a difference in the ordering of their priorities in selecting or considering content areas. The rural, Laubach tutors tended to think about the content of the materials in terms of three factors: 1) the simplicity or readability of the materials 2) whether the student is likely to find the material interesting and be motivated to read it; 3) the functionality of the material (whether it is something the student needs to know). The urban, LVA tutors were generally concerned with the same three factors, but in a different order: 1) functionality; 2) motivational impact; and 3) readability.

The rural site eventually agreed to develop materials for "Money Management". This was a negotiated compromise -- few tutors were really satisfied with the materials. The logic for the decision was that the area was depressed and thus learning more about money management would be helpful to all of the students. Hence the notion of functional materials was interpreted in terms of new instruction and new learning rather than in terms of reading in familiar and applicable domains. As discussed previously, the latter approach may be expected to facilitate the development of reading skills while the former approach, followed by the rural tutors, could slow the development of reading skills. Consistent with the "new learning" view of functional reading, Sylvia Porter's "Money Management" text was selected as the source material for developing words and paragraphs.

In the initial planning, the tutors were instructed to focus on identifying one to three content domains that would be relevant to half or more of the students. As the tutors gained practice and understanding in the development of materials, they were encouraged to define any content domain and develop materials specific to that domain and, presumably, particular to their student's interest. While the tutor working with the chicken farmer saw the interest value of working in that subject matter, no new materials were developed. A later suggestion was that they might consider developing materials to parallel the Laubach text they used for the non-computer instruction. That suggestion was enthusiastically received and one unit of Laubach material to accompany Laubach Book 4 was developed. (The use of the materials will be discussed under the topic of post interviews).

Material Development

Once the topic domain and reference materials were identified, the library staff and tutors had to develop words, definitions, and paragraphs for each domain. There were two sets of constraints on this material preparation effort: computer program constraints and "good" instruction constraints. Both were described to the library staff and tutors at the initial workshop. The presentation consisted primarily of the principles or rules and examples. There was little opportunity for practice. As the following results will suggest, the lack of extensive practice may have been one of the sources of difficulty for the developers.

The relevant program constraints were as follows. First, the definitions had to be literally reconstructed and therefore minor and arbitrary function words should be avoided and strings of alternate definitions separated by a semicolon should be avoided. Second, definitions could be no more than 22 words (132 characters). Third, paragraphs must be three to five sentences in length and the sentences can be no more than 22 words (132 characters). Fourth, the instruction will be in units of 10 words and two paragraphs and therefore there must be 10 words developed for every two paragraphs.

The instructional constraints were warnings on problems they might face in writing definitions and paragraphs and in sequencing materials. The major recommendations were as follows. First, be sure that the units are sequenced so that vocabulary are not defined in a unit after the unit, in which they are first used. Similarly, be certain that if there are conceptual dependencies between paragraphs that the more basic paragraphs come first. Second, be sure that the definitions are not more difficult then the word being defined. Check both the syntactic complexity and the word difficulty. Third, be sure the definition is relevant to the subject matter. Do not just use the dictionary definition. Fourth, be sure that there are coherence cues built into the paragraphs. One of the exercises involves sequencing the sentences and it provides an opportunity to practice and discuss cues to coherence. Fifth, be certain that the materials are not too far beyond the students. Review for conceptual familiarity, be certain that there are not too many "difficult" words in a given paragraph, and be certain that the syntax is not too complex.

Both sites submitted the first three units for review. The review indicated that there were extensive violations of all the instructional constraints and the more heuristic (as opposed to strict rules) of the program constraints. While we did not tabulate "errors" it was clear that while both sites had extensive problems, there were more problems and more severe problems in the material submitted by the rural tutors. Common problems that surfaced in the vocabulary entries were: definitions that were too long for the students to recall verbatim; definitions and examples that were abstract and general instead of concrete and personal; definitions that used terms that were not defined until later units; multiple one or two word definitions separated by a semicolon. In general the paragraphs were written at a simple level and included the use of the vocabulary from that unit. None of the word and sentence length constraints were violated. The single biggest problem among the paragraphs was choppiness and lack of coherence markers. Many of the paragraphs were simply a list of sentences on the same topic. The following illustrates some of the problem definitions and paragraphs that were generated. Instruction based on the original definitions would probably be of questionable benefit to the students.

Materials Generated by Tutors and Staff

1. Definitions too long for the student to remember verbatim:

LONG TERM LOAN: a loan repayable over twenty or more years in regular installments at fixed intervals.

Revised version: a loan to be repaid over twenty or more years.

2. Definitions and sentences abstract and general, rather than concrete and personal:

FIXED EXPENSES: The gas and electric bills are fixed expenses and must be paid each month.

Revised version: My fixed expenses are rent, gas, water, and electricity.

EXEMPT: excused from; freed from having to act.

4. Definitions and sentences that did not clearly illustrate the meaning of the word or phrase being taught:

DEPOSIT: After the policeman purchased a car he put a deposit of $50 in his account.

5. Paragraphs that lacked coherence and sequencing markers:

From "Money Management" Unit:

If you keep a large amount of money in your account, you should have an interest bearing account. If you write a lot of checks but keep extra money in your account, then minimum balance is for you. If you write a lot of checks use regular checking. If you write only a few checks a month use special checking. Free checking is best.

Detailed comments, including illustrations of how to revise the material, were made on the three units submitted by each site. The comments were to serve as guidance for revising those materials as well as for developing the rest of the units. The final submission by the urban tutors was greatly improved. While there were still problems, they tended to be low level and easily edited while transferring the materials to the program diskette. The rural tutor submissions were also improved; however, there were still significant problems which could not be fixed by editing alone. The problems included using words in definitions before they had been defined, circular definitions, long definitions, and definitions that resembled other definitions so closely that the students had trouble completing the quiz sections of the units. The main suggestion made about the paragrpahs was to increase coherence. That advice was misinterpreted, however, by at least two of the tutors; they revealed in the interviews that they had revised their paragraphs to make the individual sentences even shorter and simpler than before.

Software problems

Two problems arose when entering and testing the words and paragraphs in the LaSCAI data base. These problems point to software bugs which should be corrected before the program is disseminated. The first problem was the refusal of the authoring program to accept sentences that were "too short", at least as we interpreted the problem. Basically, there were several sentences four to six words long which were not accepted. Changing the words didn't make any difference but lengthening the sentences made them "acceptable". Second, the program attached literal spaces to words in several definitions. This showed up in the definition reconstruction exercise where a blank space was a choice in the matrix and had to be entered at a specific, but unknown, point in the definition. Since there was no way to predict where the space was to be inserted, the student kept making errors and losing points until he or she discovered where to place the space. An examination of the text files did not show any blank spaces -- thus it was not a problem of accidentally adding an extra space when the definition was input. Furthermore, there was no apparent pattern to the definitions where a space was inserted or to the placement of the space in the definition. Changing the word order of the definition in the database also had no effect. The only way to correct the error, once discovered was to use different words before and after the point of the literal space.

Implications

In sum, these results strongly suggest that the definition of materials, basically the goals for functional literacy instruction, must be centralized. Until the area of adult literacy instruction has developed further, it is simply unreasonable and unproductive to expect tutors with minimal training and experience to design a functional literacy curriculum. The danger in a centralized procedure is that the goals will not be relevant to the student population or to the existing tutoring instruction. A strength of the urban site was that "first line managers", librarians intimately involved in the program but having a breadth in perspective and training, made the decision.

The use of a centralized, trained staff is not the total solution to implementing LaSCAI or any other software program. Even with the workshop, the staff made considerable errors in generating materials and the feedback did not entirely rectify the problems. Thus a training program that goes beyond the basic workshop is required.

It is unclear whether a workshop is the best way to disseminate the program. Our own sense is that a more structured format presented through a workbook or through a computer based instructional program accompanying LaSCAI would be most effective. Regardless of the delivery mechanism, the critical feature of the instruction is the extensive presentation of examples and practice. The principles in selecting a domain and in developing materials must be made very concrete through examples. Furthermore, the tutors/librarians must have the opportunity to practice generalizing the principles to new situations, i.e., they must receive guided practice. In particular, the examples and practice in the training program should address:

- 1. The role of the content domain, the readers content knowledge, in the reading process.
- 2. The instructional strategies used in LaSCAI and how those strategies relate to the existing reading instruction. Examples based on current or common tutoring strategies appears critical.
- 3. The relationship of the vocabulary instruction to the paragraph exercises. In particular, the role of the paragraph exercises in developing comprehension skills and not just decoding skills (many tutors reported not worrying about paragraph coherence because they saw those exercises as simply an extension of vocabulary drill).
- 4. Drill and practice with definitions, paragraphs, and sequences of paragraphs. Examples which both illustrate and violate the principles of good instruction and the requirements of LaSCAI should be presented. The tutors/librarians should correct "bad" material.

PRE-INTERVIEW, TUTORS

Attitudes Toward Computer Technology

Questioning concerning the attitude toward computers progressed from a discussion of computers in general, to computer-based instruction, and finally to the LaSCAI software. By discussing computers at increasing levels of specificity, we hoped to be able to distinguish pervasive factors which we would expect to affect any computer based instruction and factors specific to the LaSCAI program. We anticipated two classes of potential problems. First, the tutors may simply reject computer technology (or the LaSCAI program). There are a variety of reasons for this, many of them identified in the growing research on "resistance to change" (Sheposh, 1982). Alternatively, they may accept the computer technology but not be able to effectively utilize it due to lack of understanding or misperceptions. All of the tutors volunteered to be part of this demonstration project and therefore we presume that while this group of tutors may have some reservations about technology, they will be technology advocates.

"Not the threat we feared them to be"

Generally, the tutors were accepting and optimistic about computers and the implications of new technologies for education and for society at large. As one rural tutor put it, "I don't really think they're the threat we feared them to be at first. Computers were going to take over the world. And they're really not--somebody has to run those computers." All the tutors were familiar with at least some computer applications. All expressed the desire to learn more about computers, which suggests an acceptance of and interest in the technology.

In order to assess their ability to actively integrate technology into their lives we asked them if they would use a home robot -- a device which conceptually is designed to meet their needs in an area where they are experts and where help is frequently required (or demanded). Specifically, we asked the tutors if they would accept a "home robot" if one was offered to them and, if they accepted it, how would they use it. While most of the tutors said that they would take a home robot if it were offered to them, for the most part they were at a loss to explain when they would do it. Four of the tutors had reservations about having the robot in their homes at all. There was also some indication in the responses to the robot question of a concern that showed itself throughout the computer questions: that computers eliminate or obstruct personal interaction, the "human touch."

The overall picture of tutors and technology is one of openness to the technology, but an unwillingness or inability to incorporate it into their lives, except as an entertainment device or to perform minor, menial functions. Part of the failure to incorporate is clearly a lack of understanding of how the technology can and cannot aid, but is also partly resistance to change and fear of the effects of the "impersonal."

Computers, kids, and society

We probed the attitudes and values related to computer based instruction by asking about the perceived impact of computers in the home, school, and workplace. The tutors noted both hazards and benefits of computers for children and for society at large.

Among the hazards computers posed for children were the possibility that kids are missing some important experience as a result of wider exposure to computers, that computers somehow preclude human interaction, that having computers around discourages children from learning the "basics," and that computer technology in the schools might foster elitism among gifted or well-to-do- children. The benefits included increased ability tc communicate, preparation for the world they will enter as adults, and decreasing computer apprehension.

Overall, the tutors were familiar with the notion of computer-assisted instruction and felt that it was useful in at least some ways. There was some feeling that kids who have a computer at home could get a head start on mastering basic skills-in direct contrast to the fears about declines in basic skills cited above. One tutor who has a computer at home wished she knew more about it because "we have a very bright little girl next door and I feel like she could read if she had a computer to play with." This comment is especially interesting since it reflects a connection in the tutor's view specifically between reading and computer-assisted instruction.

The dangers cited by the tutors that computers hold for society at large were comparable to the hazards for children listed above. Among those that were not the same, the first and most often cited danger among the rural tutors is that computers cause unemployment. The frequency and vehemence of this response can be partially explained by the fact that the primary employer in the area is the steel industry, which has become increasingly automated in recent years. Another danger cited by one tutor was also listed as a benefit by another; that advances in technology bring about better medical care (which in turn can cause over population). Several tutors listed general benefits of computers, like increased efficiency and more accurate calculations.

It is noteworthy that relatively few tutors responded by listing only hazards; in fact, one rural tutor and two urban tutors could not think of any hazards at all. The tutors as a group seem accepting and supportive of the role of technology in some domains.

Planned Use of LaSCAI

"Where's the beep?"

The quotation in the heading refers to what Tutor 2 described as her first response to LaSCAI. Recounting her impressions from the workshop/demonstration, she said, "That's what I was thinking when I was doing that program downstairs that day. I kept waiting for the beeps. Where are they? I really missed it; that's one of the first things I noticed."

She was expecting the beeps, she said, because she was expecting a computer game; and many of her colleagues felt the same way. In fact, her comment represents the view of LaSCAI that most of the tutors hold; that it's an entertaining way to introduce new vocabulary and that both tutors and students will have fun using it. Thus while the response to the LaSCAI program was very favorable, the benefits were not seen so much in the instruction it provided but rather in the benefits of associating with computers. One of the questions in the interview asked what the tutor felt her student would gain from the computer program that he or she could not have gotten any other way. The overwhelming first response to this question was "an introduction to computers." Other potential benefits mentioned were the student's increasing familiarity with the keyboard, immediate feedback, and the student's ability to use the words and definitions in several different ways to aid recall. They also cited the effectiveness of the computer as a motivational device to encourage students to continue with instruction.

We asked the tutors if they had developed specific plans for using the program. The workshop, presented approximately a month earlier, had discussed alternative strategies for using LaSCAI and for integrating it into the existing tutoring. The rural tutor's responses indicate that as a group, they were not planning to integrate LaSCAI and the Laubach instruction as much as they are planning to do both in parallel. These tutors did not consider LaSCAI to be accomplishing the same goals as Laubach instruction. LaSCAI is helpful in terms of motivation and fun to use, but the "real" instruction is the Laubach skill books. This is consistent with the emphasis on the motivational and computer experience benefits discussed above.

The urban tutors were beginning with new students and the focus of the instruction was to be the LaSCAI program. Thus questions regarding the integration of LaSCAI with existing instruction were irrelevant.

All but one urban tutor indicated that they intended to sit next to the student during the LaSCAI instruction. It seems that the tutors viewed tutoring the student as their responsibility and hence they must be a part of any and all literacy instruction for that student. Mixed in with the responsibility issue, is the feeling that the student will require the human touch. This included simply providing the warm reinforcement as well as being available if something goes wrong. Finally, and again intermixed with the other two factors, seemed to be a feeling that there was a special "human" intelligence that the tutors brought to the task. It was like the computer exercises were good but the tutor simply had to be there to add the little bit extra. The one dissenting urban tutor indicated that she planned to leave the student alone after the first session to complete the units, but be accessible to help out if necessary and to talk about the units at the end of each session.

The tutors felt very strongly that they had to be present during instruction. In the workshop it was suggested that if the student worked alone in some sessions it would allow the student to come in when the tutor wasn't available and would also open the possibility for the tutor to work with more than one student. The suggestions were resoundingly rejected.

Implications

If the computer technology is to be used effectively it must be integrated into a more complete program of instruction. While the content of the program may become the focus of instruction, it should not be the only instruction. Thus the tutors must either integrate the software into an existing program (the requirement for the rural site) or develop new instruction or instructional strategies to complement the software (the requirement for the urban site). Clearly, the tutors seem unable or unwilling to integrate the LaSCAI instruction. Moreover,this is not a problem particular to LaSCAI but rather it was a more pervasive problem with the use of technology.

We anticipated that the integration would be a real problem. In part, it is difficult to anticipate how a new and unfamiliar technology will be used. For example, Norman (1982) found that computer users could not accurately predict their use of new features and peripherals. To the extent that this is the basis of the problem we would expect integration to occur as the demonstration project progresses. However, we suspect that the problem rests with the minimal training and the lack of expertise of the tutors. Given the minimal training we would expect, and the interviews confirmed, that the tutoring is based on explicit procedural direction, i.e., following instructions for tutoring, rather than an understanding of the reading process or reading pedagogy. Under these circumstances it is not surprising that there are not plans for integrating the instruction.

The implication of this analysis is that the effective use of LaSCAI or any software is dependent on the development of explicit pedagogical instructions. These are not just instructions on what the program does and the mechanics of software management. It is also explicit instructions as to what should precede the instruction, complement it, and follow it (Duffy and Bowen, in preparation). The tutors must understand what the program does in relationship to the overall instructional goals. They must also understand what they must do to support the student while he or she is working with the program. By "understand" we do not mean simply giving the tutors rationale. Rather, the presentation must be in terms of explicit procedures.

A second issue of "effective use" is whether the software can augment the tutor effort and thus permit the tutor to reach more students. The tutors, save one, were resolute in their unwillingness to allow the student to work alone during the computer sessions. The possible reasons for this were discussed earlier. The important implication is that this attitude must change if the computer based instruction is to be cost effective and if it is to make a real contribution to meeting the needs of adult literacy. (A premise underlying this argument is that while we could invest in software that is more pedagogically sound we could make the same investment in tutor training. Both are one on one instruction. The cooperative strength is in shared -- not overlapping -- responsibilities.) Changing the attitude may simply require providing explicit instructions for use. It may also require changing the view of the computer to that of a tool, no different than a worksheet or book, rather than an impersonal "teacher". The Reading Pedagogy - "When you read, you understand things."

The questions on tutoring probed the tutor's views of the reading process and on reading instruction. We were interested in views they held regarding necessary and effective reading pedagogy. In general, the tutors feel that they are giving the students skills that will enable them to survive better both on the job and in their personal lives. As one tutor put it, "That's really all literacy is all about--when you read, you understand things, you understand the world around you better."

While "understanding" is the goal of reading, we suspected that the understanding was based on little more than the ability to decode words. This presupposition was based on the fact that the tutors are working with very basic readers as well as on the fact that the LVA and Laubach programs strongly emphasize phonics. About half way through the interview schedule, we added a question to specifically address this issue. Contrary to our expectations all of the remaining tutors indicated that reading was more than decoding individual words. Some of the tutors discussed specific tutoring activities they used to promote understanding and comprehension. However, an equal number of tutors were unable to describe how they dealt with comprehension.

In general, while the tutors seemed to hold a decoding and comprehension model of reading, the model was not well developed and did not seem to guide their instruction. Indeed, the primary guide for instruction seemed to be explicit procedural direction that accompanied the instructional materials. The tutors could not recall how they learned to read -- a model which frequently guides reading instruction. The majority of the rural tutors also could not recall or describe what they were told about skill development in the Laubach training. Instead they relied on the explicit procedural guidelines and "scripts" in the Laubach teachers' books. Similarly, few of the urban tutors could recall what they had been told about skill development (beyond the necessity of keeping the instruction geared to the student's interests and goals), though most remembered watching the slide shown and some specific techniques (experience story, sight words, phonics). Three urban tutors mentioned the tutorial book they received at the training sessions and said they followed the suggestions in it; two specifically mentioned using the list of 300 most commonly used words as the basis for at least part of their instruction.

We probed further into the instructional model of reading by asking the tutors to discuss their favorite instructional techniques -- what activities or exercises they used that were especially effective. There was a general concensus that the best instructional techniques are those which actively engage the student in some task, and that it is the tutor's responsibility to provide those active tasks. As one rural tutor put it, "The Laubach books are kind of boring. You definitely need other materials." The tutors vary in terms of how much outside work they require of the students. Several make no outside assignments at all; others make optional assignments in things like the puzzle books. Several make specific assignments and plan subsequent tutorial sessions with the expectation that the students will complete the assigned tasks.

The implications of the tutors' responses to these questions is that there is a clear potential role for LaSCAI and other computer assisted instruction in the tutoring process. The tutors feel a need to go beyond the passive test and provide the students with active learning experiences. Several tutors indicated that one of LaSCAI's advantages is that it forces the student to do something. Additionally, the tutors see the need to go beyond simple word decoding exercises and thus should value the LaSCAI paragraph exercises as more than simply reinforcing the vocabulary instruction.

However, the tutors tend to rely on procedural instructions for designing exercises -- they have only a very rudimentary model of the reading and instructional process guiding their tutoring. Thus to be effective, LaSCAI should include explicit instructions for use. This should include both when and how to use it. Indeed, it might be most effective to integrate LaSCAI in the LVA and Laubach programs such that the use of the computer program is placed fully in the context of the rest of the instruction. Potentially, LaSCAI materials (databases) would be developed to meet the needs of the tutoring programs rather than the needs of the students. Such an activity would require a more complete analysis of the Laubach and LVA instruction.

Motivation and Training for Tutoring

The questions about why the tutors joined the literacy program were designed to show whether some motives exist that might conflict with the idea of introducing computer technology into the tutoring process. For example, if a person's reasons for becoming a tutor were mostly social, he or she might resist the introduction of non-human elements such as the computer. As a group, however, the tutors seemed less motivated by social goals than by the desire to help others--a motivation that leaves more room for the addition of the computers if the technology is viewed as a means of helping.

Most tutors expressed altruistic motives for joining the literacy program, which had mostly to do with their own love for reading and their desire to share that skill with people who lack it. Another motive cited by three tutors was the hope that tutoring experience wouldhelp them later as they tried to get jobs in education.

All but one of the nineteen tutors had undergone a minimum of 12 hours of formal training based on the Laubach or LVA methodology. Tutors at both sites noted that the formal training was of necessity only a first step; many felt that the real training began when they started working with their first students. Tutors at both sites also felt that the training should include more instruction in specific strategies for keeping discouraged students involved in tutoring, which seemed to be a continuing problem.

Tutors at each site had other recommendations for how the training they received chould have been improved. One rural tutor suggested periodic "refresher" courses on new materials and techniques, while an urban tutor recommended more emphasis on the basic LVA techniques.

Although most of the tutors were pleased with the methodology they were using, some tutors at each site had criticisms of the instructional principles followed at that site. The rural tutors noted that there was nothing in the Laubach series that allowed a student to work on specialized vocabulary he or she might need on the job or in school. Two tutors felt that the lack of evaluation and testing in the Laubach method created some problems with students who refused to practice their skills outside the tutorial sessions (by doing outside assignments, for example). As they understood the Laubach method, students were not to be "tested" but only work through the exercises. Thus the student would be passed on from book to book simply based on completing exercises, even if there was little skill retention from class to class.

The urban tutors were enthusiastic about the LVA methodology but had different ideas about what the methodology was. The majority (five) thought it rested on functional or goal oriented instruction; two thought it rested on starting with phonics and building up to sentences, with relatively little emphasis on the role of content. The urban tutors expressed a need for more guidance in choosing materials to use with students who were unable to articulate specific goals for learning to read.

One of the questions in the interview was, "In what way was the act of tutoring different from how you had expected it to be?" Only the tutors who had previous teaching experience felt that their expectations had been accurate; the other tutors experienced surprises of several kinds: students slower than they had expected; students who refused to do assignments and/or dropped out after a brief period; and students whose reading problems were part of larger problems with language or learning. Two tutors were pleasantly surprised by the experience of tutoring, finding their students enthusiastic and the act of tutoring less difficult than they had believed it would be. Two of the students experiencing difficulty, noted the frustration of performance plateaus. That is, the students progress simply comes to a halt for some significant period of time before progress begins again. Such learning plateaus are common in skill development, but can be extremely frustrating in a tutoring situation, it may well be that a major strategy for integrating LaSCAI and other drill and practice programs into tutoring will be as a means of overcoming the plateaus.

Several of the interview questions probed the tutors' opinions about what kind of tutor-student relationship is necessary for successful tutoring and what their students expect and receive from literacy tutoring. If a very close bond is necessary, then it would seem that the tutor would not accept a computer-student pairing, but could accept a tutor-student-computer triad.

There was a good deal of disagreement among the tutors about the issue of close tutor-student relationships; the group split almost evenly. But they all agreed that even if a close relationship is not necessary to successful tutoring, it is desirable and helpful. There is a general sentiment, therefore, that the quality of the interpersonal relationship between tutor and student is important. The implication for LaSCAI from this data is similar to the implication noted in the "Attitudes Toward Computers" section; LaSCAI must be understood as something that can be a part of the personal interaction between tutor and student, not as an impersonal machine. Specific guidance for making it part of that personal interaction is needed.

Tutors' views of students -

Why do students join and drop out?

The questionnaire also probed the tutors understanding of their students' goals in entering literacy tutoring and why some students leave the program before they finish. If the tutors do not see LaSCAI as consonant with their students' goals, they will be less likely to welcome and use it. There is little reason to believe from their responses that this is in fact a problem.

The tutors gave a wide variety of reasons for why particular students had joined. Many of these revolved around self-improvement, in terms of either economic gains or personal growth.

Several tutors had had students drop out of the literacy instruction before they had completed the program. Many of those who dropped out had moved to another area for either familial or employment reasons, or had transportation problems. Three of the tutors related that they thought their students had become bored or disillusioned with tutoring after the first few lessons, finding it more difficult or less engaging than they had expected it to be. Clearly, the motivational elements of LaSCAI--the game format, the novelty of the computer-based instruction--could be useful in countering the problem of boredom.

What do students gain from literacy training?

Another of the interview questions solicited concrete examples of the kinds of things a student would be able to do or to read at the end of literacy training that he or she could not do before. The tutors' responses should suggest how well the functional approach that underlies LaSCAI fits with the kinds of skills the tutors believe their students to be receiving. Most of the tutors listed life-skills or functional kinds of activities as those their students were acquiring, which suggests that LaSCAI could play a role in the overall benefits to the students.

Only one of the tutors felt that the students would be able to read any or everything; the other tutors listed more specific achievements, such as the ability to enter GED training, read to their children, read work orders on the job better, and find their way around more easily. Several suggested that their students might enter the job market as a result of literacy training.

There is nothing in the tutors' responses to suggest that their view of student goals is in any way incompatible with LaSCAI instruction. In fact, the more functional the student's goals, the more appropriate LaSCAI could be.

Are students embarrassed by their illiteracy?

There is a common belief among many who tutor in volunteer literacy programs that their students are embarrassed by their illiteracy and hence would be unwilling to do anything that might reveal to others that they cannot read, in spite of evidence to the contrary (Charley and Jones, 1980, 20-21, for example). It is reasonable to believe, then, that if the tutors feel that using LaSCAI will in any way compromise the student's privacy, the tutors will resist it on that account.

Interestingly, all the tutors mentioned, in one part of the interview or another, experiences their students had shared with them or incidents that had occurred which reflected some embarrassment on the student's part about their lack of skills. But when asked about it directly, almost all of the tutors denied that their students had discussed or displayed any embarrassment. As a group, however, the Mary Weir tutors raised several objections in one meeting about the pre-testing of the students for the demonstration project, feeling that having to confess to an evaluator that they were non-readers would deter some students from participating in the program.

However, of the 14 students who were contacted at the two sites about participating, only one had refused, even though they knew they would have to talk to the experimenter. The one student who refused was not worried about being tested and interviewed, but about her computer competence--she was afraid that she would not be able to do the computer exercise. No student refused because he or she would be interviewed and tested.

The tutors' comments indicate a belief that having the computers located so as to provide privacy (that is, away from the main floor or main thoroughfares of the library) will be a benefit to their students. Another strategy for encouraging the students' privacy is to remind them that if visitors come in while they are working and watch as they use LaSCAI, the students can ask the onlooker to leave if they wish. Simply reminding them that they have the right to use LaSCAI without having the computer screen observed by library visitors may help them insure their own privacy. It is clear, however, from the student's willingness to participate in the project even though it meant allowing an "outsider" to know that they were learning to read, that the tutors' worries about the threat of exposure in that context were exaggerated.

Pre-Interview: Students

Attitudes toward computer technology

Students were questioned about their experience with computers and their interest in using them. If students feel intimidated by computers we would expect that they would feel uncomfortable and would therefore be unsuccessful working with the computers in this demonstration. Overall we found that students at both libraries knew little about computers, but were interested in learning about them.

Like the tutors, most of the students had limited familiarity with computers but wanted to know more about them. Students at both libraries were most familiar with computers from video games. Twenty-five percent of the rural students had computers in their homes which they used for games only, while 12.5% occasionally typed on a computer at work. The urban students reported somewhat more experience with computers; 16.5% used a computer frequently at work for data processing while another 16.5% had taken a six week adult education course in "Computer Literacy".

Students mentioned three reasons for wanting to be part of the computer reading project: to try using a computer; to improve their reading skills; and to get training they felt might lead to a job with computers. Several students who said they were interested in the project because it offered a chance to try using a computer said that their children were or would soon be using computers at school. These students said they wanted to keep up with their children or be able to help them with their work on computers. Students who offered the second reason--to improve their reading skills--saw the LaSCAI project primarily as a new way of helping them learn to read. These students seemed to have reached the "plateau" that tutors described where they were making slow, but steady, progress with reading. They seemed to feel that using LaSCAI would help them regain enthusiasm for learning to read. Other students said that they were participating in the LaSCAI project because they felt it might lead to a job using computers. Several of these students were currently unemployed.

Students at both libraries said they felt computers were important, yet most were unable to say why they felt computers were important. Several students explained that they had heard on television that everybody would soon need to know about computers. The data indicates that students generally do not understand what computers can do and how they can be used outside of games. As a result, students may overestimate the power of computers and the "edge" that gaining some experience with computers will give them in society. Students may also overestimate the amount of knowledge about computers that they will get in the LaSCAI program. Potentially these false expectations may eventually have a detrimental impact on students' assessment of the value of the instruction. At the same time, however, using computers in the LaSCAI program will give most of these students more experience with computers than they currently have. That experience may be enough to help them get a job in which they would use a computer particularly as many people applying for those jobs would have no experience at all using computers.

Functional Literacy Requirements

The questions in this section were designed to provide information about why students wanted to read better, what their goals for reading were, and what difficulties, if any, they had had because they were unable to read well. We feel that LaSCAI will work most effectively if students feel it is compatible with their goals for literacy.

We asked students at both sites why they had decided to start literacy training and what they hoped to be able to read when they had finished. Because answering general questions is often difficult, we put these two questions in specific and concrete terms. Some of the questions we used as we probed were, "Has there ever been anything that you wanted to read but weren't able to? Is that something you want to be able to read when you finish tutoring?" and "Would your job be easier if you could read something that's hard for you to read now? Is that something you'd eventually like to be able to read?"

Students at both sites offered a variety of reasons for having started literacy training. The students at the two sites differed noticeably in the reasons they gave for beginning tutoring. On the whole, the rural students' reasons were more job-oriented; about 50% felt that improving their skill at reading would help them advance in their present jobs or enable them to read application forms well enough to get jobs.

Students in the urban program most often said that they felt that tutoring in reading would help them improve themselves in a general way. They viewed reading as a means of social and economic advancement, saying reading was a way "to better myself", "to advance", or "to have a better life". Even after considerable probing, these students were unable to describe the changes reading would make in more specific terms.

Students at both sites said that they wanted to read better in order to help or keep up with their children. Many of these students had children who were just entering elementary school. Students of both sexes offered this reason, with women only slightly out numbering men.

There was also a marked difference in the responses students gave to the questions about their goals for reading. Almost all of the rural students were eventually able to list specific material that they would like to be able to read. More than 50% said that they wanted to be able to read the newspaper; others mentioned job applications, magazines, and the Bible. The urban students, however, generally had considerable difficulty saying what they would like to be able to read when they finished tutoring. More than half the students simply said that they wanted to be able to read "anything I pick up." Even after further questioning, they were unable to list their priorities for reading.

Overall, for the two questions on reasons for beginning tutoring and goals for reading, the rural students gave more specific answers than did the urban students. One reason for this may be that most of the students at the rural site have been involved in tutoring for several months. During that time, they may have become more articulate about their goals or more familiar with ways that reading can help them. If that is true, the urban students may also be able to put their goals in concrete terms after they have spent more time in tutoring. Another explanation for the difference may be differences in the environments around the two sites. Students in a rural area, on the other hand, may have more specific goals because they want to change their lives in a more limited and definable way. These differences between students in urban and rural sites may have considerable impact on the way students in the two sites respond to the LaSCAI program. Further data is still needed to understand the differences fully.

Over half the students said that they had had problems because they lacked skill in reading. The two types of problems most frequently mentioned occurred in applying for jobs and in dealing with unfamiliar situations. Several students described devising ways of getting around their problems by relying on memory or friends, or by limiting themselves to familiar activities.

A subset of the questions on reading were designed to determine if students are embarrassed by their illiteracy and, if so, how that might affect their participation in literacy instruction. Literature on adult tutoring suggests that embarrassment about illiteracy may prevent adults from coming in for tutoring because they are reluctant to admit even to a tutor that they have difficulty reading. Students who are embarrassed may prefer working on reading with the computer if they feel it affords them more privacy than does working with a tutor.

Although students at the two sites admitted to having been embarrassed because of their iliteracy, they did not, in general, seem as the tutors had anticipated. All of the students were willing to talk to the investigators and take a reading test before they began the project. One student even volunteered to try the LaSCAI program at a public demonstration of the Library's new computers. This evidence suggests that the students will not be too embarrassed to use the computers provided the sites locate the computers where the students can have some privacy.

The Reading Process

In this section we asked students about their perception of reading, the difficulties they encountered in learning to read, and their view of the student-tutor relationship. The way that students perceive reading and their tutor may significantly affect their reaction to computer software and their success in the LaSCAI project. Students who value a close relationship with their tutor, for example, may be most comfortable if the tutor works with them at the computer.

Far more than the tutors, the students seemed to view reading essentially as decoding. This was particularly true at the rural site. There, 75% of the students said that "the sounds" or learning the sounds associated with letters was the hardest part of reading. Almost all these students also said that the work they did on phonics was the most important part of their tutoring. Several said that it was this work that distinguished Laubach tutoring from the instruction they had received in school and enabled them finally to make progress in reading.

More of the students in the urban program felt that being able to read meant more than simply being able to decode words. Thirty-three percent of the students said, for instance, that they sometimes had trouble understanding what they read even though they could read all the words. These students felt that skill at decoding, by itself, would not make them competent readers. They were unable, however, to say how they could improve their comprehension through tutoring except by increasing their vocabulary.

While students' perceptions of their problems reading may be inaccurate, their perceptions still play a large role in the students' reactions to the training they receive. Students who feel they need help with comprehending material rather then decoding it may respond well to LaSCAI's comprehension and paragraph exercises. Students who feel that their biggest problem in reading is decoding words will probably want to continue working on phonics with their tutors as they use LaSCAI. This suggests that, ideally, LaSCAI should be modified to include work on phonics. A synchronized tape-recording or a voice synthesizer could be added to allow students to hear the words they were learning. Adding this oral, phonics component would also allow LaSCAI to be used with students who read below the fourth grade level and lack basic decoding skills.

Student-tutor relationship

Students at both sites described two types of help that tutors gave them: first, encouragement and support, and then guidance in reading. Several of the students felt that the emotional support their tutors provided was the most important element in their success in reading. Students in the rural program more often mentioned the importance of their tutor's emotional support, perhaps because they had worked with their tutors longer than had students in the urban program.

Students in both programs described work with phonics as the most important instructional help that the tutors gave. Students mentioned that tutors taught them the sounds associated with letters, how to recognize "families" or groups of related words, and even how to find misspelled words in the dictionary.

These perceptions have several implications for the LaSCAI program. First, it suggests that the program should be integrated with other material in the lessons. Ideally, the tutor might work with the student at the computer, helping the student decode the new vocabulary words and supplementing LaSCAI's paragraph exercises with content-specific questions about the material the student is reading. These data also suggest that if LaSCAI is used at other sites, it should be viewed as a supplement to student's work with the tutor rather than as a replacement of it. Students clearly value the interest that the tutor takes in their progress. Tutors are also able to provide kinds of practice that LaSCAI cannot provide. Finally, the data in this section supports modifying LaSCAI to include a phonics component in order to provide students help in an area they find particularly difficult.

LaSCAI

Questions in this section provided information about students' expectations for the LaSCAI program. Students were asked to describe what they thought would be the strengths and weaknesses of learning to read with a computer, and how they felt about starting the program. The students had not seen the LaSCAI or any other reading software and thus the questions were probing their expectations for computer based instruction, obviously an important consideration in implementing computer based instruction.

Students answers to these questions provided relatively little data. Even after probing, more than half the students at the two sites said that they were unable to imagine what working with the computer would be like. Some students seemed irritated to be asked about using the computer before they had tried it. A few students were able to imagine some benefits of using the computer. They said that the computer would be "patient" and let them work at their own pace. Students had similar difficulty imagining drawbacks of working with the computer. The limitations that students could imagine were of two types: that the computer could not give affective responses and that it would be slower than a tutor in recognizing where students were having trouble. One of the students suggested that the ideal would be to use the computer in conjunction with the tutor, so that the student would have personal interaction, help with phonics, and the benefits the computer could provide.

Implications

Three main implications emerge from the students' data. First, students need a better understanding of what to expect from computer-aided instruction. This includes information about what they are actually learning about computers as well as how the computer can and cannot assist their learning. These students should be aware that reading software is not designed to provide an introduction to the computer; it is not designed to lead directly to jobs with computers. Nevertheless, students may benefit on the job or in looking for jobs because of having gained some experience with computers in the LaSCAI program. Simply having used the computer and having overcome their apprehension about the new technology may give students in the LaSCAI program an advantage in looking for jobs.

The second and most important implication from the data is that students will not accept tutoring without a human tutor. They strongly value the emotional support as well as the range of feedback the tutor provides. The tutor's encouragement seems particularly important for students whose families do not support their efforts in reading. This does not mean that each and every tutoring session must involve a tutor-student-computer triad, but rather that the tutor and student must share the instructional responsibility over the course of the instructional program.

Finally, an oral component should be added to the program so that students can hear the new vocabulary words as they are reading them. As students progress through the units they encountered increasingly difficult vocabulary; even students with fourth grade decoding skills may have some difficulty when they first encounter these words. Adding an oral component will also allow the LaSCAI program to be used with pre ABLE students who lack basic decoding skills. With this modification the program could even be used by students at the first grade reading level and could enable tutoring programs to provide help to many more students.

DELIVERY

We collected data during the course of the demonstration project from both sites. This data included information on attendance, reports from the staff on the use of LaSCAI at their site during the project, and observations of students and tutors in computer tutoring sessions and in conventional tutoring sessions.

Attendance

In collecting and analyzing data on attendance we sought to answer two questions. We wanted to know, first, if using LaSCAI increased students' motivation to stay in tutoring. Since attrition is a perennial problem in adult literacy programs, instructional techniques that increase motivation and attendance are particularly needed. Second, we wanted to know if students' interest in the program and their attendance remained consistent during the course of the project. Consistent attendance would indicate that students were not simply intrigued by the novelty of using the computer, but were instead satisfied that they were learning something valuable by working with LaSCAI.

Data for this section is drawn from two sources: records supplied by the staff at the two demonstration sites, and tutors' and students' descriptions of their attendance collected in the final interviews.

We found that neither site was able to provide us with detailed records of attendance. We believe that neither site maintained records on attendance that included all of the following: the number of times participants met during the project; the number and percentage of times students or tutors cancelled previously scheduled meetings, and comparable data on students not participating in the demonstration project. Since the two sites provided different types of data on attendance, correlating their attendance data is impossible.

The staff at the large urban site reported that the average attendance of tutors in the demonstration project had been 45%, with a high of 65% in November, and a low 26% in December. Average attendance of students at the same site had been 40%, with a high of 45% in November, and a low of 25% in December. These figures represent the percentage of scheduled sessions for which students and tutors showed up. The staff of the urban site was not able to provide us with information on the number of times student-tutor pairs had met to use LaSCAI, nor with the length of their tutoring sessions.

Information on attendance at the rural site was collected from the tutors' records, covering the period between December 2, 1984 and April 29, 1985. According to these records, the tutors in the project met with their students for LaSCAI tutoring a mean of 6.4 times during the demonstration project; the range of LaSCAI tutoring sessions was 4 to 9 times. The tutoring sessions ranged in length from 0.75 hours to 2.5 hours, with a mean length of 1.48 hours. No information is available about how often students or tutors at the rural site did not attend meetings that they had scheduled.

Neither site was able to provide comparative data on the attendance of student-tutor pairs who were not part of the demonstration project. As a result, no reliable comparison can be made between pairs using LaSCAI program and those using conventional tutoring. The limited attendance records that both sites maintained are typical of volunteer literacy programs (Lutheran Church Women's Volunteer Reading Aides Evaluation Project, 1982). Because of understaffing and high demands on the tutors' time, volunteer programs often keep only minimal records of attendance or time spent on tutoring.

Students and tutors reported that a variety of causes kept them from attending tutoring sessions every week. These causes included ill health, bad weather, personal problems, and conflict between their job schedule and their tutoring schedule, all typical causes of poor attendance (Lutheran Church Women's Volunteer Reading Aides Evaluation Project, 1982). Two special factors also influenced attendance at these sites. At the rural site several of the students and tutors had to travel up to 15 miles to reach the Library. These students had difficulty meeting when snow made the small rural roads treacherous. At the urban site only two computers were available which made re-scheduling missed appointments difficult. At both sites, attendance reached its lowest point during the weeks immediately before and after Christmas.

LaSCAI's effect on attendance

The lack of comparative data at the two sites makes it difficult to answer the first of our questions, how LaSCAI affects students' motivation and consequently their attendance. While the 40% average attendance of students reported at the urban site appears low, it is still within the norms for volunteer literacy programs (Russ-Eft, Rubin, and Holman, 1981). Staff at both sites reported that attendance of participants in the demonstration project was comparable to that of other student-tutor pairs at their site. It seems safe to conclude that using LaSCAI does not cause students and tutors to attend any less regularly than their counterparts in conventional tutoring. On the other hand, it does not appear that using LaSCAI significantly improved students' motivation in this project and prompted them to attend more regularly than their counterparts in conventional tutoring.

The novelty effect

Data from the urban site showed that students who continued in tutoring attended almost as regularly at the end of the project, (40% of the scheduled sessions), as they did at the beginning, (45% of the scheduled sessions). This data suggests that the computer program held a lasting, rather than a temporary, attraction for the students who continued in tutoring at the urban site. Attendance at the rural site appears to have been relatively consistent also. While month-by-month figures are not available, the coordinator at the rural site maintained that tutors and students had met with about the same frequency throughout the program, except during December and the beginning of January when bad weather and poor road conditions had impeded attendance.

The fact that attendance remained fairly regular throughout the project among students who continued in tutoring is reassuring. Not all students, however, remained in the demonstration project. Six students dropped out of the project before completing their first LaSCAI disk. Two others were not allowed to participate in the project, although they were originally scheduled to be participants. (For a further discussion of attrition, "Attrition.")

Observations

The data we collected during our observations of participants and the final interviews were designed to enable us to determine if tutors in the project were able to integrate the LaSCAI program into their tutoring and, if so, if using LaSCAI or other computer-based literacy programs would be cost-effective for volunteer tutoring programs. More specifically, we sought answers to the following questions: If student-tutor pairs use both LaSCAI and conventional tutoring, do the non-computer sessions complement the computer sessions? Do students using the computer spend more time on-task than students in non-computer sessions? How is time not on-task spent during tutoring sessions? Does the tutor use that time to supplement instruction with additional explanation or is the time used for administrative matters and other, non-productive activities? How did tutors adapt their teaching strategies for the computer? To answer these questions we collected data from three sources: observations of the participants; reports from the coordinators at the two sites; and the final interviews of both students and tutors.

Number and schedule of observations

At both sites we observed both computer-based and non-computer tutoring sessions. Because the rural site was closer we observed tutoring sessions there more frequently and over a longer period of time. Seven observations were carried out at the rural site during a period of approximately two months, from January 31 to March 28. This was approximately mid-way through the demonstration project. Observations were not collected on a regular schedule since bad weather and unpredictable schedules of the student-tutor pairs prevented long-range planning. Six observations were carried out at the urban site during a period of three days, March 28-30, at the end of the demonstration project.

Table 1 below presents the number of observations at both sites and in both conditions.

Table 1

Table: Number of Observations by site and condition:

Site	LaSCAI sessions	Non-LaSCAI sessions	(Totals)
Rural	5	2	(7)
Urban	2*	4	(6)
(Totals)	(7)	(6)	(13)

*Students observed were not among those in the original demonstration project. See the discussion that follows for an analysis of the effect that difference may have had.

At the rural site four student-tutor pairs used LaSCAI throughout the demonstration project. Each of these pairs was observed as they used the computer. Two of these pairs alternated LaSCAI sessions with Laubach sessions. Both of these pairs were also observed as they used the Laubach materials. At the urban site two of the students and one of the non-LaSCAI students started tutoring after the demonstration project began and were not formally part of the demonstration project. However, all of the demonstration project students had either dropped or completed LaSCAI tutoring. Thus we chose the two LaSCAI students as the only observation alternative. The LaSCAI students we observed were tutored by the full time library staff rather than by the volunteers. This was fortuitous for, as we shall see, the library staff approached tutoring very differently from the volunteers.

Observation form and procedures

The observations were designed to provide information about how tutors integrated LaSCAI into their tutoring strategies. From the observations of LaSCAI sessions we hoped to learn what assistance tutors provided to students as they worked on LaSCAI, what supplementary material, if any, tutors used as they worked with the program. From the observation of the non-computer sessions we hoped to learn about the same variables in conventional tutoring. This data on conventional tutoring enabled us to determine what effect LaSCAI had on the tutors' usual teaching strategies.

Observation of LaSCAI sessions

The observations collected data on the entire tutoring session. Since it was often unclear when general small talk ended and the session began, we defined the beginning of these sessions as the point at which the student and tutor sat down at the computer. Likewise, we defined the end of the session as the point at which the pair left the computer. Anything, including administrative business, that took place outside that period was not recorded.

We conducted two reliability tests to ensure that observations done by the three researchers would be consistent. Researchers A and B both observed the first LaSCAI session at the rural site and recorded their observations independently. The correlation between their observations was 100%. Researchers B and C observed a non-LaSCAI session at the urban site and recorded their observations separately. The correlation between their observations was 86%. The high correlations among these raters gives us confidence that our observations are reliable.

We designed the observation form to measure three things: what percentage of the session the student spent on task; what activities took up the rest of the session; and what kinds of assistance the tutor provided. The form was divided into two-minute intervals and was comprised of the following five categories:

- o Student working alone (column A);
- o Tutor helping with hands on keyboard (column B);
- o Tutor commenting or explaining material on screen (column C);
- o Tutor extending or adding information (column D);
- o and Administrative (column E).

Column A denotes time the student spent working independently: columns B-E denote time spent on other activities. We recorded observations at timed intervals to ensure that the data we collected were regular and consistent. A copy of the observation form we used is available through the US Army Human Engineering Laboratory Office of Research and Technology Applications (ORTA).

Time on task is a critical variable in learning. Several definitions, however, of time on task are possible. One would include all activities in a tutoring session except administrative ones. We rejected this definition because it would have included general conversation and encouragement as time on task. While both of these activities may help create a climate that makes learning possible, neither contributes directly to understanding the material on the screen or in the text. Similarly, we did not classify time in which the tutor was asking questions or providing information about the lesson as time spent on task. Our reason for this is that only appropriate and timely help from the teacher actually fosters a student's learning. Premature "help" can even delay learning. Since tutors' comments varied in their appropriateness, we did not classify them as time spent on task. Our definition, then, of time spent on task was limited to time the student spent working independently, (col. A). When the student was working alone with the computer program or a text, we felt that he or she most clearly engaged in an activity that directly promoted learning.

We felt that two columns, B and E, measured time spent unproductively. Once the initial training was over, we felt tutors should not put their hands on the computer and type in responses for the student. Doing so prevents the student from answering independently and is likely in the long run to make the student more dependent or timid. Similarly time spent on administrative matters--setting up a time for the next session, correcting the student's work while the student waited--was time lost from learning.

On the other hand, time spent on activities in columns C and D might be either helpful or unhelpful depending on what the tutor said and whether the student would have been able to understand the material as well without the help. Some examples of assistance that seemed helpful were: helping the student sound out "revolving" (col C); pointing out a similarity between a word ending on the computer and word endings the student had studied in the Laubach book (col D); and explaining that "definition" means "what the word means" (col C). Responses that seemed either neutral or unproductive included: giving the student the answer to prevent him from making a mistake (col C); pointing out the student's score (col C); and making an analogy that the student does not understand (col D). In interpreting the chart (Table 2-A) that follows readers should keep in mind the varied quality of the assistance in columns C and D.

Observation of Non-Computer Sessions

In observing the non-computer sessions (Table 2-B) we continued to be interested in the amount of time the student spent on task, the ways in which the other time in the session was spent, and kinds of assistance that tutors offered. As in the computer sessions, we collected data at two minute intervals. We modified the categories we used on the observation forms to make them appropriate for text-based sessions. The categories we used in these sessions were:

- Student working alone (column A);
- Tutor reading material or giving the student the answer (column B);
- Tutor prompting the student for an answer (column C);
- Tutor adding or extending information (column D);
- and Administrative (column E).

These categories are, in their essence, very similar to the categories used for the computer sessions. Column A measures time spent on task. Column B represents unhelpful intervention by the tutor. When tutors read material in the student's text to the student or supplied an answer before the student tried to answer, they pre-empted the student's role. Columns C and D again represent potentially helpful intervention by the tutor, either helping the student recognize an answer or supplying relevant information that the student did not have. As in the computer-based sessions, intervention in these columns could also, be unproductive if it was premature or superfluous. Column E again represents time spent on administrative matters.

Table 2

Table: Use of Time during Tutoring Sessions - by condition and by site.

A. LaSCAI sessions:

	A	B	C	D	E
SITE	Student alone	Tutor with hands on keyboard	Tutor commenting on screen	Tutor adding information	Admin
Rural	71.2%	0.6%	24.2%	4.9%	0.0%
Urban	88.5%	0.0%	0.0%	0.0%	11.5%

B. Non-LaSCAI sessions:

	A	B	C	D	E
SITE	Student alone	Tutor reading or giving ans.	Tutor prompting	Tutor adding information	Admin
Rural	39.5%	22.5%	7.0%	21.0%	10.0%
Urban	45.8%	6.5%	21.5%	2.8%	23.2%

Findings from observations

The most obvious result in Table 2 is the absence of any tutor activity in the LaSCAI, urban condition. This is not typical volunteer tutor behavior. As noted in the table, the students observed were not part of the demonstration and the tutor was a paid library staff member. These pairs were observed because they were the only individuals available at the time of our visit.

The urban, LaSCAI tutor observations were, in fact, a fortuitous event. It was the only tutoring we observed where the tutor allowed the student to work alone -- an important strategy for cost effective use of computer software. Sam, the staff member who served as tutor, was considerably more experienced and comfortable using the computer than any of the volunteer tutors. He had programming experience and had supervised the use of LaSCAI during the project. During most of the two sessions we observed, Sam let the students work on their own at the computer while he worked on something else at the back of the room. The students knew that they could call on him if they had trouble. Because Sam was not beside the students as they worked, there were no instances of his putting his hands on the keyboard, commenting on material on the screen, or supplying new information.

We believe that this was not typical of the way the volunteer tutors used the LaSCAI program. In the final interviews, the urban tutors described using the program in much the same way as the rural tutors had. Only one of the tutors reported that she had ever left her student to work alone at the computer. Sr. Raphael said that she felt that her student was competent enough to work independently, but she felt out of touch with her student's progress unless she sat beside her student as she worked. Sr. Raphael, like Sam but unlike the majority of the tutors, had had considerable experience teaching, having both taught in a high school and tutored several other adult students, as well as some familiarity with computer-assisted instruction. None of the other urban tutors reported that they had tried leaving the student at the computer; in fact, some of them suggested that to do so would be irresponsible. We expect that had observations been done of the volunteer tutors, more activities would have been recorded in the "tutor intervenes" categories and fewer in the "student works alone" category.

The students being tutored at the urban site using LaSCAI were junior high school students. Sam indicated that he was willing to leave these students alone because he presumed they had familiarity with computers (and hence they were "comfortable" around them) and they did not yet have a long history of failure (and hence did not require the degree of human support that many adults do). Sam indicated that he would use the same monitoring approach with adult students as long as they exhibited the same characteristics.

The students did not appear at all bothered by the low level of monitoring. In post interviews they both indicated they preferred instruction over the computer and one student clearly indicated a preference for the teacher to be absent (see the post-interview findings for a discussion of this issue).

These and the other data we collected during the observations suggested six important conclusions about the use of LaSCAI during the demonstration project. These findings have implications for the cost-effective use of LaSCAI and other computer-based literacy programs. In our analysis of the data we used information from the final interviews, when available, to corroborate what we observed.

1. Students can work with LaSCAI without constant monitoring by the tutor. While only one student at a time was being tutored during this demonstration, the infrequency of interaction between tutor and students suggests that the tutor could monitor ten to fifteen students working on the software. Let us emphasize again, however, that this is not a stand alone program of instruction. Thus while the tutor could monitor that many students simultaneously, additional, individual human tutoring sessions would be required.

2. In general, tutors conducted computer-based sessions in much the same way as conventional tutoring sessions. Almost all of the tutors at both sites sat beside the student throughout the tutoring session, providing information, and answering questions. Only the paid, trained staff at the two sites and the tutor with the most teaching experience allowed their students to work alone at the computer. This finding raises implications about the cost-effectiveness of LaSCAI or similar programs and about the training of tutors for new modes of instruction.

One of the attractions of computer-assisted instruction is that it could enable literacy programs to reach more people with the same number of staff or tutors. However, computer-assisted instruction is cost-effective only if it frees tutors and staff to work with new students. Tutors who now meet with one student twice a week for conventional tutoring might meet with two students, meeting each once a week for conventional tutoring and scheduling each for a computer session independently during the week. In this way a tutor who now teaches one student could instead teach two, without giving up much more time.

If, on the other hand, tutors sit with their students throughout the computer sessions, the computer-assisted instruction is not cost-effective in terms of personnel because it has not freed the tutors to reach more students. In order for computer programs to make a literacy program more cost-efficient, they must be designed so that students can work on them independently and the tutors must be trained to use the programs in ways that exploit the potential that these programs have.

Efficient use of computer-assisted literacy programs therefore requires that tutors and staff be trained to make effective use of the program. Our data suggests that tutors do not develop cost-effective strategies for using the computer on their own. There are two possible reasons for this. First, tutors may not believe that their student is able to work alone at the computer. Adult students probably do need the tutor's help as they begin using a program; many, however, will be able to work comfortably on their own once they have become familiar with it. (For further discussion, see "Final Interviews"). Second, tutors may feel that they ought to stay beside the student because that is the only tutoring pattern with which they are familiar. When we interviewed Sam, the staff member at the urban site, about why the tutors had not used LaSCAI in the same manner as he had, he said that the tutors had been expected to stay beside their students. Several of the tutors said that sitting beside the student was important. Tom, for instance, said, "I would do the same thing that I did [if he used LaSCAI again], just stay, sit next to the student and help them...I don't think that any student should be left alone because, unless the student says it out loud, there's no way to tell if he makes a mistake or not. He may read a word and mispronounce it." Tutors like Tom felt that the correction and reinforcement the computer program provided was not sufficient to teach their students.

3. Students spent more time on task during computer sessions than during noncomputer sessions. In fact, in the urban site students spent almost twice as much time on task in the computer tutoring sessions as in the conventional tutoring sessions. Again, the fact that only a paid staff member was observed using LaSCAI at the urban site may have affected this finding. At the rural site, however, where four of the volunteer tutors were observed using LaSCAI, students still spent considerably more time working on their own in computer tutoring sessions than in conventional tutoring sessions. The difference between the mean scores for time spent working alone at the rural site was in fact 31.7%. Since time on task is of critical importance in learning, this increase in time spent on task when students worked at the computer is particularly significant.

4. More time was spent on administrative matters in the non-computer sessions than in the computer sessions. Since time spent arranging the next meeting or finding materials is time not spent learning, an instructional technique that decreases time spent in this way should contribute to learning. One reason that administrative time decreases when students and tutors used LaSCAI may have been that the program provides a clear sequence of instructional activities. Tutors do not need to find new materials during the lesson or stop and decide what activity to do next. Additionally, tutors did not need to take time during the session to correct work that the student had done as homework or during class. Particularly in the urban site we observed tutors spending time correcting work as the student looked on. While students may learn from the tutor's comments about their mistakes, they are unlikely to learn during the time they simply sit and watch the tutor go through their work.

One factor may have confounded our finding about the amount of time spent on administrative matters. We began our observations of the LaSCAI sessions when the tutor and student went into the computer room and sat down at the computer. If they spent time arranging up-coming meetings before that point, we would not have recorded it.

5. Tutors more frequently added or extended information in conventional tutoring sessions that in LaSCAI sessions. What we classified as adding or extending information included pointing out the relationship between new material and what the student already knew, drawing an analogy from the student's own experience, and asking the student's opinion of issues treated in the text. When such assistance is well-timed and apt, it is of considerable value for students. However, if the assistance tutors offer is not well-timed or is not appropriate, then it will be irrelevant or even distracting to the student.

A closer look at tutors' comments which we observed may make the difference between helpful and unhelpful ones clearer. At the rural site, for instance, we observed a tutor help her student decode a difficult word. She said, "You know, that's a '-tion' ending like we've had in the book." Her comment was designed to link what the student was learning at the computer to what she was studying, in the alternate sessions, in the Laubach book. The comment seemed to help the student make out the word and may have helped her see the connection between the two "texts" she was studying. Similarly in a conventional tutoring session at the same site, we observed Rita compare a character in the story she and the student were reading to a local woman in a similar position. Rita's comment seemed to make what was happening in the story clearer to her student. Comments such as these help students learn.

On the other hand, not all of the comments tutors made of this type seemed well-timed or relevant to the what the student already knew. For example, as one tutor at the rural site explained how to pronounce the word "again", she compared in the local pronunciation of the word with its pronunciation in New England. Since her student was a non-native speaker of English and unfamiliar with regional variations in pronunciation, the discussion did not appear to help the student understand.

There are two probable reasons that tutors less frequently extended or added information when they worked with the computer. At the urban site, the tutor we observed did not stay with the students as they worked. Obviously, if he was not with them, he could not offer them this kind of help. At the rural site, the infrequency of the tutors' adding or extending information seems to have a different cause. The current version of the program does not allow tutors either to review or preview material. Several of the rural tutors reported that they had no idea of what material they would encounter in a session. Only tutors who had been given a copy of the paragraphs on the disk, could plan for their lessons at the computer.

The tutors themselves felt that the difficulty of preparing for lessons was a significant problem. One said,

> Probably it [LaSCAI] was easier than working with the books, easier but at the same time I didn't feel that I was doing a good job. I didn't have anything that I had to do except be there...With the Laubach I did a lot of beforehand preparation. Well, I always went completely through the lesson and...if I would think that there could be a problem here I could have ready another suggestion in addition to what Laubach did.

The current lack of flexibility in the program kept this tutor from preparing as well for LaSCAI as for the Laubach sessions and therefore from supplementing the LaSCAI lessons in the way that she had the conventional sessions. If tutors continue to sit beside their students, they should be as well prepared as possible to supplement what the program offers in valuable and unique ways. (For further discussion of suggested adaptations of LaSCAI, see "Final Interview").

6. The other assistance that tutors gave likewise varied in its appropriateness and instructional soundness. This in itself is not surprising. All teachers are occasionally unsuccessful in the help they give, and tutors with little training may be unsuccessful more often than better-trained teachers. However, one of the patterns of unsuccessful "help" in the computer sessions seems noteworthy. We found that tutors frequently offered students hints about correct answers if the student seemed to be about to make a mistake. Tutors who commented about this in the final interviews felt that such intervention was appropriate. Tom, for instance, described working with his student in this way.

> I watched him constantly. And when he was about to use the wrong word or use the wrong part of the sentence, I explained to him why he should use another word or a different part of the sentence. I worked with him very closely.

Similarly, we observed two of the rural tutors write down the definitions and sentences in the LaSCAI exercises so that they could prompt the student with the right answer if he or she seemed about to make a mistake.

While students occasionally need to be helped because they feel "stuck" or discouraged, often such assistance seemed premature. Computer-assisted instruction is designed to teach by providing immediate and relevant feedback when students make mistakes. If tutors believe that making a mistake is embarrassing for their students and that they ought to save their students from this embarrassment, then they may short-circuit the instructional techniques on which the program is built.

FINAL INTERVIEWS

At the end of the demonstration project final interviews of tutors and students were conducted at both sites. Interviews at the urban site took place between March 28 and 30. Interviews at the rural site took place on May 8. All of the original participants who were available, including those who were no longer using LaSCAI, were interviewed. At the urban site six of the original tutors and two of the original students were interviewed. At the rural site, five of the original tutors and four of the original students were interviewed. (For a discussion of attrition during the program, see "Attrition", below).

Interviews lasted approximately 45 to 75 minutes. The interviewers asked the participants a series of open-ended questions about their use of LaSCAI, problems they had encountered while using the program, suggestions for improving the program, their plans for future tutoring, and their attitude toward computer-assisted instruction after having participated in the project. Participants seemed more comfortable and somewhat more communicative in these interviews than they had in the interviews at the start of the project.

Attrition

Like most volunteer literacy projects, this demonstration project suffered from attrition by both students and tutors. Of the fifteen students who began the project, eight were still in tutoring at the end of the project, and five of those students were still using LaSCAI in their tutoring sessions. Of the original fifteen tutors, eight were still tutoring the students with whom they had been matched at the beginning of the project. Only one tutor had ceased to tutor altogether.

Attrition was more severe at the urban site. There, five of the seven students who had begun the project had dropped out of tutoring entirely, and none of the students was still using LaSCAI when the project ended. The students reported a variety of reasons for withdrawing from tutoring, including personal problems, family problems, and conflict with their schedule at work. Two of the students who were to have participated in the project did not, one because her reading level was too low to read the material on the disks, and the other because she reported that her new schedule at work would keep her too busy.

Table 3 that follows presents more detailed information about the status of the original participants at the end of project. The reasons listed for students who dropped out of tutoring are those which the tutors reported that students had given.

Table 3

Table: End of Project Status of Students -- Urban site

Name*	Status at end of project
Hope	Dropped after 2nd session - personal problems
June	Finished 1st LaSCAI disk (Driver's Ed); declined to do 2nd LaSCAI disk; continued in conventional tutoring
Janet	Began 1st LaSCAI disk (Income Tax); dropped out of tutoring - personal problems
Louise	Reading level too low to participate in project; continued in conventional tutoring.
Mike	Finished 1st LaSCAI disk (Driver's Ed); studied printed material on driving; dropped all tutoring - job conflict
Mary	Dropped out of tutoring before beginning LaSCAI
Marlene	Began 1st LaSCAI disk (Income Tax); dropped out of tutoring unable to continue.

*All participants have been renamed to preserve their anonymity.

Attrition was less severe at the rural tutoring site. Six of the original student-tutor pairs who had begun the demonstration project were still in tutoring when the project ended. Five of these pairs were still using LaSCAI. David, a student in one of these pairs, had withdrawn from tutoring for five months but had resumed tutoring with LaSCAI before the project ended. Of the three students who were not using LaSCAI when the project ended, one had completed a LaSCAI disk and had gone on to use other computer-assisted instruction, one had dropped out of tutoring altogether, and the third had not been allowed to participate because her tutor felt that the LaSCAI material would be too difficult for her.

Table 4 that follows presents detailed information about the status of the students at the end of the project. As in the preceding table, the reasons listed for dropping out of tutoring are those which the tutors reported that students had given.

Table 4

Table: End of Project Status of Students -- Rural Site

Name*	Status at end of project
Akiko+	Using 1st LaSCAI disk (Money Management)
Art	Dropped LaSCAI after 1st lesson, (problems commuting); Dropped Laubach tutoring in December
Bettina+	Finished 1st LaSCAI disk; now using CAI in typing
Wen-Su+	Using 1st LaSCAI disk (Money Management - lesson 3)
Carl	Using 1st LaSCAI disk (Money Management - lesson 18)
David	Had dropped all tutoring for 5 months; now 1st LaSCAI disk (M.M. - lesson 3)
Dan	Dropped out of tutoring - health and job problems
Grace	Tutor would not let her use LaSCAI; still in Laubach tutoring

*All participants have been renamed to perserve their anonymity.

+Denotes a non-native speaker.

Information about which lesson the student was working on was supplied in each case by the tutors. That information may not be accurate since some of the tutors said they had difficulty knowing what lesson on which they were working. When no information about the lesson is given, the tutor had been unable to tell us what lesson she and the student had done in the last session.

At each of the sites a student has been barred from using LaSCAI because her reading level was considered to be too low. Louise, at the urban site, would probably have been unable to use LaSCAI effectively. Her tutor reported that she was reading below the third grade level, and she had been unable to answer the first question in the Level 1 ABLE test after seven minutes. We believe that her lack of skill in reading would have made using LaSCAI frustrating and unproductive for her.

With Grace, however, the situation seems different. According to the ABLE test, Grace's reading level was 6.0+ grade level, well above that of several other students who participated in the project. Grace was also enthusiastic about using the computer. She had, in fact, volunteered to demonstrate the LaSCAI program at the Library's Open House. Grace's tutor, however, said that she considered the LaSCAI material too difficult for Grace and would not let her use the program. It may be significant that Grace's tutor had helped in designing the Library's LaSCAI materials and had not been happy with the material the other tutors developed. Grace and the tutor continued with Laubach tutoring.

Findings

Our analysis of the data from the final interviews yielded the following findings.

1. Several of the tutors reported that their attitude toward computers and computer-assisted instruction had changed as a result of their experience in this project. Perhaps most enthusiastic of these tutors was Rita, at the rural site, who said,

> I don't feel it's so impersonal now. ...[It's] not machine-like; it was a new, fun way to do what I'd been doing with the books. ... Honestly, I didn't think it would work. I saw no way that a program could do what I had been doing from books, with written material before. But now, I see that it works.

Several tutors who reported feeling more positive about computer-assisted instruction said that they no longer feared that the computer was designed to replace the teacher or tutor. They said they now felt that the computer was another tool that they could use in teaching. Ruth, for instance, another rural tutor, said that she now felt that the computer program was a good supplement to what she could do with the Laubach books. At the same time she felt strongly that the program was only a supplement and should not be used as an entire course of instruction.

As tutors came to see the computer program as another tool which they could use in teaching, their fears about its impersonality seemed to decrease. Peggy, one of the rural tutors, said that she was surprised to find that she could work with the student while she was using the computer. (Peggy had apparently been afraid that, once the student began working on the computer during a session, she would be left sitting beside her, unable to interrupt). Ted, one of the urban tutors, also said that using the computer program had changed his opinion of computer-assisted instruction. He explained, "I feel a little differently. I see where they might facilitate the learning process just a little bit faster."

Another indication of the tutors' increased acceptance of computer-assisted instruction is that four of the tutors at the urban site and three at the rural site reported that they would like to continue using LaSCAI. Another two at the rural site said they "might" continue using the program if the bugs in the current version were eliminated. In addition, two of the rural tutors had begun to use other computer-assisted instruction with their students since the demonstration project began. Since none of the rural tutors had ever used CAI before the demonstration project began, it is likely that their experience with LaSCAI made them more interested in other types of computer-assisted instruction.

2. Several of the tutors reported that they felt their students would be able to use LaSCAI on their own. Two of the paid staff and one of the tutors had, in fact, let their students work alone for at least some of the tutoring sessions. Sam, the project coordinator at the urban site, said that he had encouraged his students to work alone at the computer because he did not want them to become dependent on him. Tina, a staff member at the rural site, had also let her student, David, work by himself. She explained.

> He came twice a week. The first day we would go on the computer, and I would just let him go on by himself. ...If he had a question, I was there, but a lot of the time he didn't even have a problem. ...He seemed to be better if I wasn't watching. ...I really think that he can learn on his own on it, if I just give him the software. I'm sure he can do it.

Several of the tutors who had not yet allowed their students to work on their own said that they felt their students would be able to do so. Ted, at the urban site, said, "I think he [the student] would need a little light supervision, [but] I don't think that he would need for someone to be with him each and every time. Kind of a little light supervision, just to check up."

Several of the students agreed that they would feel comfortable working at the computer by themselves. Two even pointed out advantages of working alone, Wen-Su replied,

> Yeah, you know, I think so, because practicing by myself I can take time. Sometimes working with a tutor...I mean, they have somewhat patience, you know, but I feel quilty, you know, because they might think I'm too stupid, I'm too slow.

Carl, another rural student said,

> I think I would feel comfortable...if it was working right. If there were someone here, if I had a problem they could take care of it for me, so I wouldn't mess the machine up. ...Yeah, I would like to use it on my own. When I use it, I would like to have,... to be by myself and not have someone walking around me, because I do get upset by that. I don't know why.

This finding has significant implications for future uses of LaSCAI and other computer-assisted instruction for adult literacy. Tutors and students both felt that, after having become familiar with the program, students could work on their own at the computer. If so, the literacy programs could use the program in more cost-efficient ways. One trained tutor or staff member could supervise a computer lab in which students worked independently at the computers. If a student had trouble, the tutor or staff could provide help. This arrangement would have a practical and a pedagogical advantage for the volunteer literacy programs. First, it would reduce the burden on tutors and enable them to take on additional students. With only a little extra preparation time, tutors could teach two students instead of one, alternating computer sessions with conventional tutoring.

Such an arrangement might also provide students with some advantages. Students would have more privacy as they worked with the program. They would also have a greater chance to learn through the feedback that the program provides. (We found in our observations of tutoring sessions that tutors often tried to "save" the students from the embarrassment of making a mistake, and so circumvented the principle of "error - correction - reinforcement" that the program is built on). A supervised computer lab would probably also give students greater flexibility in scheduling practice sessions. Students could drop in at a lab whenever they had time, enabling them to work with the program at odd hours, when meeting the tutor would be impossible.

3. At the same time we found that none of the staff, tutors, or students we interviewed felt that this program was sufficient by itself to teach a student to read. Repeatedly in the interviews we heard that LaSCAI was an effective supplement but not a reading course in itself. Nina, who had encouraged her student to work alone, still said. "It [LaSCAI] won't replace the teacher but it's a great teaching tool. You still need that one-to-one, personal contact." As in the initial interviews, students and tutors both maintained that personal contact is an important component of tutoring.

In addition, several tutors and students felt that the computer program did not offer a wide enough range of content, exercises, or instructional techniques to constitute an entire reading program. Tutors cited the limited variety of topics presented, the absence of work on phonics and pronunciation, the limited opportunity for writing, and the absence of comprehension or "personal opinion" questions. Tutors and students at the rural site seemed more concerned by these limitations, probably because they were accustomed to the instructional techniques of the Laubach books. Even at the urban site, however, June had dropped out of the LaSCAI project but had continued with conventional tutoring because she felt it offered her more.

Our findings suggest that students and tutors in volunteer literacy programs will not accept LaSCAI and similar computer-assisted literacy programs as sufficient instruction on their own. Students and tutors see CAI in literacy as a supplement, not an alternative, to conventional tutoring. Presenting LaSCAI as a "stand-alone" literacy program, therefore is very unlikely to be successful in a volunteer literacy program.

4. Tutors at the rural site had difficulty integrating LaSCAI into the rest of their tutoring program. (Since the urban tutors were using LaSCAI as essentially their entire course of instruction during the demonstration project, this finding is less relevant to them). At the rural site, none of the tutors reported using LaSCAI and the Laubach materials during the same lesson. Two of the tutors alternated LaSCAI and Laubach sessions, one gave up using Laubach during the project, and one arranged with her student for him to work on Laubach independently at home. (The student of the fifth tutor had already completed the Laubach books, so integrating material was not an issue). Tutors' comments on the difficulty of integrating LaSCAI with the Laubach instruction corroborated the lack of integration we saw during the observations.

Another indication of the difficulty that tutors had in integrating LaSCAI and Laubach material is the low use of supplementary materials. None of the rural tutors reported that they had used any supplementary materials as they worked with the LaSCAI program, although several reported frequently using such material when they worked with the Laubach books. Four of the urban tutors reported using supplementary materials. The materials they mentioned included the dictionary, magazines, phonics worksheets, and booklets on content material similar to that on the LaSCAI disks.

We believe that there are two primary reasons for the difficulty tutors had integrating LaSCAI with other Literacy Instruction. First, tutors at both sites found it hard to prepare for tutoring sessions. The LaSCAI program does not currently allow tutors to "look ahead" or preview material. Only a few of the tutors had been given print-outs of the words or paragraphs in the LaSCAI units. Tutors at both sites said that not knowing what would be covered in the next lesson made it impossible for them to anticipate what supplementary material would be relevant.

Second, tutors at the rural site were accustomed to using Laubach materials, which differ in content and in instructional approach from the LaSCAI program. Laubach materials concentrate on teaching phonics skills. Tutors often use worksheets or other material on phonics as a supplement. Laubach also has a series of "readers" on a variety of subjects which tutors can use as additional material. Tutors accustomed to the Laubach materials, which provide considerable direction and a supply of additional material, may have found it very hard to determine what kind of supplementary material would be appropriate to use with LaSCAI and then locate it. This difficulty was no doubt compounded by being unable to anticipate what would be covered in the next LaSCAI lesson.

The staff at the rural library did make an attempt during the demonstration project to link the LaSCAI program to the Laubach material by developing a new unit based on the Laubach Book 4. The staff adapted the definitions and paragraphs used in Book 4 for the LaSCAI disks. None of the tutors in the demonstration project switched to the Laubach units from the original Money Management unit, but two other tutors are currently using this material. It is not yet clear how tutors will integrate the LaSCAI, Book 4 material with their regular Laubach tutoring.

5. Tutors continued to see the purpose of functional or relevant materials as motivation. Using the LaSCAI program had not made them believe that reading materials that were based on an area about which the student has relevant prior knowledge would significantly improve the student's progress in reading, except by helping to keep the student's interest. This belief is at odds with the instructional principle on which the LaSCAI program was developed, namely that when students are reading in a familiar content domain, there prior knowledge about the subject enables them to devote more attention to the difficult process of learning to read. If the successful use of LaSCAI, (particularly the

successful development of materials), depends upon an understanding of this generative model of reading, then tutors need to be taught more about the generative model. This instruction should be included in the initial workshops on using LaSCAI. When tutors do not understand the model of reading on which the program is built, it is unlikely that they will be able to use the program most effectively.

6. Developing suitable LaSCAI material is difficult for tutors who are unfamiliar both with LaSCAI and with the generative model of reading. The tutors at the rural site expressed considerable dissatisfaction with the LaSCAI material on the Money Management disk. Several said that it was too hard for their students; others, that it was boring. Ironically, many of these same tutors had helped develop the material they were criticizing. The tutors at the urban site where the staff had developed the LaSCAI units, did not report being as unhappy with the LaSCAI material.

At the end of the project, the majority of tutors at both sites felt that tutors should not develop the units for LaSCAI. Four tutors at the urban site held this opinion; three at the rural site. Two of the urban tutors suggested that students should design the units, since they felt that students would best know what level of difficulty was appropriate. Another tutor suggested that the tutors not design the units, but be brought in to give suggestions and review them. One of the rural tutors said she felt "professionals" should design the units, since "we made too big a deal of it. Now it worked out fine, but I don't see a lot of the things we had written to be in it, thank the good Lord." Only one of the rural tutors felt that the tutors should continue to design the units since she felt they would know best what would appeal to their students. One of the rural staff members also said that she would like to see tutors use the Authoring Program to develop material that was individually tailored for their students.

As our previous discussion pointed out, the paid staff had both more training and more teaching experience than all but one or two of the tutors. This training and experience enabled them to develop more successful LaSCAI units. If LaSCAI is used at other sites, tutors should not be asked to design units. We believe that trained staff members should use suggestions from the tutors to develop appropriate material.

7. In the final interview, the tutors suggested a variety of changes which they felt should be made to the LaSCAI program and the training that tutors received. These proposed changes fell into three categories: eliminating bugs, improving the instructional design, and developing supplementary instructional or training materials.

Problems with the program

Tutors cited a variety of bugs in the current version of LaSCAI which they felt interfered with learning. They felt that these problems needed to be corrected before LaSCAI was used at other tutoring sites. The most frequently mentioned problem was that the program would periodically fail to generate vocabulary or paragraph exercises and prevent the student from continuing the lesson. This problem is caused by "literal spaces" in the material that has been encoded on the disk. These spaces cannot be detected in advance and must be corrected with the Authoring System. Since neither site had a copy of the Authoring Program for the first half of the demonstration project, all faulty disks had to be sent to Carnegie-Mellon to be corrected. This often entailed a delay of up to two weeks, during which time the tutor and student either had to use other, non-LaSCAI material or forego tutoring.

The delay that occurred while disks were sent from the sites and corrected caused two problems for students and tutors in the project. First it contributed to the slowness with which students progressed through the LaSCAI units. Tutors and students were unable to work on LaSCAI while the disks were being corrected. (Students did not use other, temporary student disks because they wanted to maintain an accurate record of their scores.) The rural tutor who reported that her student was on Lesson 3 at the end of the project also reported that she and her student had missed four weeks of tutoring sessions because of this problem with the program. Second, tutors reported that the delays discouraged students and, in at least one case, contributed to attrition. Evidence that supports the tutors' opinions is that three of the students who dropped out of LaSCAI tutoring continued with conventional tutoring for at least a while.

The second most frequently cited problem was "scrolling." When the program scrolled, it would not allow the student to answer but would instead complete the exercises itself. This meant that students were unable to learn from those exercises and that the student's score became inaccurate. Since disks which scrolled could not be corrected, students had to start over on new disks, repeating lessons they had already done. Students and tutors both reported that students were disturbed by the inaccuracies in their scores and in having to spend lesson time repeating material they had already studied. Other bugs or problems which participants mentioned were unclear or overly-difficult instructions, apparently incorrect responses to student input, and poor division of sentences in the reconstruction exercise.

Improving instructional design:

Tutors proposed several changes to the program which they felt would improve LaSCAI's instructional design. The most frequenctly mentioned of these changes was increasing the flexibility of the program. Four tutors said that they felt students should be able to review material if they needed extra practice. In this regard, tutors felt the current version of LaSCAI was inferior to books or workbooks which allowed students to review and practice material as they needed. Tutors also felt that the program should allow tutors to preview upcoming lessons without disrupting the student's score or progress through the disk. They said that the inability to preview material made it impossible for them to prepare for the tutoring sessions. Three of the rural tutors also felt the program should make record-keeping easier for the tutor by supplying cumulative records of scores from the lessons and unit tests which could be printed out for the student and the tutor.

Tutors suggested several additional exercises which they felt should be included in the program. Two tutors and two students said they would like LaSCAI to include exercises which required the student to do more writing. One student suggested that students should type their responses in full rather than merely hitting the space bar to indicate a response. Two tutors said they would like the program to include comprehension questions that would test the student's understanding of the passage and require the student to type a longer response. An urban tutor said she felt the program should add exercises on phonics.

It is not certain that the changes that tutors proposed would either be feasible or would lead to better instruction. Many of the changes, however, seem sound and should be considered if further adaptations are made to LaSCAI.

Additional training or material:

Seven tutors said that they felt they needed more training than they had received before they began the demonstration project. Most of these said they should have been encouraged to spend more time using LaSCAI before they began working with their student. Staff members of both sites said that they felt tutors should have additional material available with ideas and hints about using the program effectively. Tutors at the rural site who were accustomed to the Laubach books which provide considerable guidance to the tutor seemed to miss this support material more than tutors at the urban site.

SUMMARY AND IMPLICATIONS

This year-long project was undertaken by the National Commission on Libraries and Information Science, the US Army, Carnegie-Mellon University, and the local libraries to determine the requirements for effective application of computer-based instruction in library-based adult literacy programs. The LaSCAI reading program was selected because it was flexible, inexpensive, suitable for Apple II computers, and designed to accommodate adult-oriented material. Two demonstrations sites were selected to use the program. These two sites were chosen as representative of volunteer literacy programs throughout the country. One was located in a branch library of a major eastern city; the other was located at the main library of a small eastern, industrial town. Both sites volunteered to participate in the project.

The goal of the demonstration was to find the problems which arose as volunteer tutors used LaSCAI with their students and to formulate strategies for dealing with those problems. The research project had three phases: initial interviews of students, tutors and staff who would be involved, review of materials developed for use with the LaSCAI, observations of tutors and students using LaSCAI during the course of the demonstration project, and follow-up interviews of all participants. A summary of the findings from the demonstrations and their implications for future use of LaSCAI and similar computer-assisted instruction is presented below.

Demographic data

Tutors:

Age and sex: Eleven female and four male tutors took part in the demonstration project. They ranged in age from the early twenties to the early 70's; the median age was 44 years at the urban site and 39 at the rural site.

Training and Experience: All but one tutor had received 12 to 16 hours of tutor training and had tutored at least one student prior to beginning the demonstration project. While four of the tutors had prior teaching experience in the schools, none had experience or training in teaching reading except for the volunteer tutor program.

Students

Age and sex: Five male and 10 female students were originally scheduled to participate in the demonstration project. The median age of these students was the late twenties. Most of the students were native speakers of English; the three non-native speakers of English were all at the rural site.

Reading ability: Students at both sites were given the ABLE reading test. Level 1, 2, or 3 to assess their reading ability. The mean grade-level reading score at the urban site was 7.6; at the rural site 4.1.

Previous Experience in Literacy Tutoring: Students at the two sites had been involved in tutoring at the demonstration sites a median of 4.5 months. The median length of involvement at the urban site was .25 months and at the rural site 4.75 months. Sixty-seven percent of the students at the urban site reported that they had attended other tutoring or adult education programs; 25% of the rural students gave a similar answer.

Initial Attitudes

Tutors

Attitude Toward Computers: In general, tutors were optimistic about computers and their implications for education and society at large. Nevertheless, tutors reported reservations about using computer-assisted instruction with their students. Tutors felt that LaSCAI, or other computer-assisted instruction, might be impersonal, and felt that illiterate adults particularly needed support and encouragement that only the tutor could provide.

Implication: Since the tutors in this demonstration project had all volunteered to participate, they were probably more interested and open to computers than most tutors in volunteer programs. The fact that even these had fears about using computer-assisted instruction with their students suggests that tutors in general may have reservations about adopting a new technology. If so, tutors will need training that addresses their reservations.

Attitude Toward LaSCAI: After a demonstration and an opportunity to work with it, some of the tutors were very enthusiastic about using the program. However, while the program was viewed favorably, the benefits were not seen so much in the instruction it provided but rather in the benefits of "introducing computers" and motivating the student. At the rural site, LaSCAI was considered helpful in terms of motivation, but the Laubach skill books were considered the real instruction.

Planned Use of LaSCAI: While the workshop discussed strategies for integrating LaSCAI in a program of instruction, all of the tutors indicated an intent to use only LaSCAI or to use LaSCAI in parallel with, but independently of, the normal tutoring.

Implication: Tutors did not readily recognize the place of the LaSCAI vocabulary instruction and reading exercises in a more complete program of instruction or did they recognize the potential for creating materials to fit their needs. Training and procedural instructions will be required to facilitate the integration of LaSCAI in a more complete program of instruction.

The Reading Process and Pedagogy: The tutors held a decoding and comprehension model of reading, with a strong emphasis on decoding. However, neither that model nor the concepts provided in tutor training appeared to guide their instruction. Both rural and urban tutors seemed to be guided by the instructions in their books, including suggested activities, to guide their instruction. The favored approach to instruction, and one consistent with the LaSCAI program, is to insure that the student is an active learner.

Implication: The tendency of the tutors to follow the instructions in the book reinforces the need for specific instructions for the use of LaSCAI in a complete program of instruction.

Role of the Tutor: All but—one tutor indicated the intent to sit by the student during LaSCAI instruction. Tutoring the student was viewed as their responsibility and thus they must be present to provide the human touch.

Implication: If the tutors do not allow the students to work independently, the cost effectiveness of computer based instruction will be lost.

Students

Reasons for Participating in the Demonstration Project: Students mentioned three reasons for participating in the demonstration project: to try using a computer; to improve their reading skill; and to get training they felt might lead to a job with computers.

Implication: Students may need more information before they begin to use LaSCAI about what they will actually learn about computers. If students, like the tutors, believe that the benefit of LaSCAI is developing job related computer skills they may become disillusioned as they work with the program. (However, prior use of a computer could be beneficial in indicating the individual's lack of anxiety about computers).

Goals for Reading: Students at the two sites differed in the reasons they gave for having entered tutoring. In general, students at the rural site were more job-oriented, reporting that they had begun tutoring in order to get or advance in a job. They reported wanting to be able to read the newspaper, job applications, magazines, and the Bible. Students at the urban site said they felt learning how to read would help them in a more general way, leading to social or financial advancement. They were less specific about specific materials they wanted to read, generally citing that they wanted to read "anything I pick up."

Development of Materials

Functional Literacy: Tutors generally did not understand the role of subject matter knowledge in reading. Reading was more of a "bottom up" decoding process then an anticipation of content. As a consequence, the subject matter of the reading materials was seen only as a motivational issue -- will it hold the readers attention.

Identifying a Content Domain: Tutors at the rural site had extreme difficulty identifying reading domains relevant to the reading needs of a majority of their students. As noted above, they saw the content as a motivational issue and no functional topic seemed as interesting as a Laubach story about adults. Once they selected a topic (money management) they had difficulty identifying reading materials the students would have to use in daily life. Instead they went to more advanced instructional materials (Sylvia Porter's Money Management) for vocabulary and paragraphs. Furthermore, tutors later reported dissatisfaction with the materials developed, indicating the materials were not of interest to many of the students and tended to be too difficult.

The paid staff at the urban site identified appropriate content domains and sources of materials. They had little difficulty identifying relevant domains (e.g., driving) and functional materials (e.g., the Driver's License Handbook). Tutors using the materials reported being generally pleased with the LaSCAI materials they used.

Implication: It seems that the breadth of experience of the paid staff, the ability to look at "program" needs rather than the needs of the particular student now being tutored, and a clearer understanding of the role of content in reading facilitated the identification of "meaningful" functional materials. With experience in tutoring and with LaSCAI the tutor may be able to identify and select materials relevant for his or her particular student. However, it seems clear that at least initially the experienced staff should be responsible for identifying the program goals including the functional domains and materials.

Developing words and paragraphs: The tutors at the rural site and the paid staff at the urban site assumed responsibility for identifying vocabulary, developing definitions, and developing paragraphs to be used with LaSCAI. Both tutors and staff had difficulty in developing materials, tending to produce definitions that were abstract and more difficult then the word being defined and paragraphs that lacked coherence. However, the urban staff showed fewer problems and benefitted more from feedback on an initial set of materials submitted for review.

Implication: The effecti ess of instruction will only be as good

Implication: The effectiveness of instruction will only be as good as the quality of the materials and the exercises employed. The difficulties in developing materials clearly implies that trained staff should be responsible for developing materials. That training should involve both background in reading instruction (as with the paid urban staff) and training (perhaps a guidebook that provides extensive examples and practice) for developing materials. At the end of the project, the majority of tutors at both sites felt that tutors should not develop the units for LaSCAI.

Attendance

Consistency of attendance: Attendance records at the two sites showed that, among students who remained in tutoring, attendance remained fairly constant throughout the demonstration project. Attendance was lowest at both sites in December when bad weather and Christmas activities disrupted tutoring schedules. Neither site was able to provide comparative attendance data on student-tutors pairs who were not involved in the demonstration project.

Attrition: Like most volunteer literacy programs, this demonstration project suffered from attrition by both students and tutors. Of the fifteen students who began the project, eight were still in tutoring at the end of the project, and five of those students were still using LaSCAI in their tutoring sessions. Students reported a variety of reasons for withdrawing from tutoring, including personal problems, ill-health, family problems, and conflict with job schedules. Two students completed a LaSCAI program and chose to continue in tutoring using traditional materials. One of the students indicated that the functional content of the other LaSCAI disks was not of interest or relevant to him.

Implication: Volunteer literacy programs should not see LaSCAI or other computer-assisted instruction as a guarantee against attrition. Students will continue to drop out of computer-assisted literacy instruction for the same reasons as they drop out of conventional tutoring.

Tutoring Sessions

Student Self-Sufficiency: Students were able to work alone at the computer without constant monitoring by the tutor. Only the paid staff used LaSCAI in this manner, but their success with it suggests that the program could be used cost effectively, with one trained tutor supervising and monitoring several students at the computers. The LaSCAI program, however, is not designed as a stand-alone program of instruction and should continue to be supported with individual human tutoring sessions.

Implication: LaSCAI could be used cost-effectively at tutoring sites. After initial training with the program, 10 to 15 students could work simultaneously in a "computer lab", supervised by a trained staff member. Students would receive additional, individual attention from tutors.

Integrating LaSCAI: LaSCAI instruction was intended as the focal instruction at the urban site and thus there was not an existing program in which to integrate LaSCAI. However, these tutors reported using supplementary materials which included the dictionary, magazines, worksheets, and printed material on topics similar to those on the LaSCAI sessions with Labauch sessions; the others suspended Laubach instruction during the demonstration. Three factors seem to have contributed to the difficulty in integrating material. First, LaSCAI and Laubach differ significantly in both the topics they cover and the instructional techniques they use. Second, tutors could not preview material in upcoming lessons; this made it impossible for them to know beforehand what supplementary material would be appropriate. Third, the Laubach workbooks provide specific directions for developing supplementary material designed to complement the instruction. Thus the tutors may have been less prepared to find or develop supplementary material of their own.

Implications: If tutors are to provide appropriate prior, concurrent, and follow-on instruction, they need training to enable them to do so. This training should teach tutors to provide the instruction which LaSCAI cannot provide and to avoid duplicating the instruction LaSCAI offers.

Tutors Role: Tutors conducted computer-based tutoring sessions in much the same way as conventional tutoring sessions. Unlike the paid staff, tutors sat beside students throughout the sessions. Their behavior and their reports during the sessions were consistent with the pre-demonstration attitude that they had a responsibility to be with the student. Some tutors felt that students needed the tutor to tell them when they had made mistakes.

Implication: When students are able to work independently at the computer, it is not cost-effective for tutors to continue to work beside them. Tutoring programs will need to train tutors in using the computer effectively if they intend to make computer-assisted instructions cost-efficient.

Time on Task: Students using LaSCAI were found to spend more time on task than students in conventional tutoring. Since time on task is of critical importance in learning, this increase in time on task is particularly significant.

Administrative and "Telling" Time: Tutors spent less time on administrative matters and in unproductive intervention in computer sessions than in conventional tutoring sessions. Tutors in computer sessions less frequently took over the student's role by typing the responses for the student than tutors in conventional sessions, by reading the text to the student or giving the student the answer.

Instructional Support: Tutors more frequently added or extended information in conventional tutoring sessions than in LaSCAI sessions. Tutors reported that they had been unable to prepare for computer sessions because the program did not allow them to preview the material in up-coming lessons. If they were provided with the listing of materials to occur in a session, they might play a more active tutoring role.

Prompting Responses and Preventing "Errors": In computer sessions, tutors frequently offered hints about correct answers when the student seemed about to make a mistake. Tutors commented that they felt making mistakes was embarrassing for students and that they wanted to save their students from this embarrassment. Since LaSCAI, like other computer-assisted instruction programs, is designed to teach by providing immediate feedback and the opportunity to repeat troublesome exercises, such premature "help" may short-circuit the instructional principles on which the program is built.

Implication: Tutors require instruction in how to work effectively with computer based instruction. The training they receive should explain the instructional principles on which LaSCAI is built and should model appropriate strategies for working with the program.

Software Bugs: There were several program bugs which interfered with instruction, sometimes resulting in a week delay in instruction. Tutors felt these problems and the delays they caused interrupted students progress, discouraged students, and may have contributed to attrition. The bugs included the presence of spaces in some definitions that held the place of words. This bug required the student to solve the "mystery" of the correct place for the space when constructing the definition. Another serious bug involved the program beginning to scroll through the exercises and eventually "dying" such that the student could not continue.

Implication: Debugging is a standard requirement in the development of any software and should not present particular problems with LaSCAI -- it simply must be done. LaSCAI has been directly implemented from a research program without support or time for a debugging effort. Before other volunteer programs use LaSCAI, the bugs in the program should be eliminated. Unless that is done, students and tutors will continue to lose time, enthusiasm, and continuity as they work with the program.

Final Views:

Attitude Toward the Computer: Overall, tutors felt more positive about computers and computer-assisted instruction at the end of the demonstration project than they had at the beginning. Several reported that they now felt the computer was less impersonal than they had feared. Others reported that they now felt that computers were designed to supplement tutors, rather than replace them. Two of the tutors had begun to use other computer-assisted instruction with their students, and seven reported that they would like to continue using LaSCAI if the bugs in the program were eliminated.

Role of Functional Material: The tutors' view of the role of functional reading material did not seem to change during the demonstration project. Tutors continued to believe that the primary benefit of relevant reading materials was that they motivated the student. Tutors did not, however, believe that functional reading material affected the process of learning to read.

Tutor Role in LaSCAI: Tutors and students felt that, after having become familiar with LaSCAI, students could work on their own at the computer. However, only one tutor had encouraged the student to work alone. Several students agreed that they would feel comfortable working alone; some indicated they would prefer to do so.

Implication: Tutors initially might resist allowing their student to work independently at the computer, but after a brief experience they appear open to this cost effective and potentially instructionally beneficial approach to teaching. However, it would seem that direct instructions in how to schedule or manage the tutoring is necessary -- while they seemed willing to allow the students to work independently, they did not actively move to institute such sessions.

LaSCAI as a Program of Instruction: Tutors responded favorably to the LaSCAI instruction but offered numerous suggestions for modifications of existing exercises and the inclusion of additional exercises. The most frequently mentioned addition was exercises that required the student to recognize the meaning of the word in a sentence. Finally, tutors indicated a need for more variety in LaSCAI topics -- a library of material.

Implication: The suggestions are quite appropriate and the LaSCAI program could most likely be modified to accommodate all of the suggestions. The pronunciation facility and the proposed comprehension exercises would probably also facilitate the integration of LaSCAI into a more complete program of instruction.

CONCLUSION

The LaSCAI program can be used cost effectively in the volunteer tutor programs. Ten to fifteen students could work at the LaSCAI program with minimum supervision and alternate those sessions with one-on-one tutoring sessions. This strategy would double the number of students with which a tutor could work. The computer based instruction may be preferred by some students, but, overall, the program should not be used as an entire course of instruction. LaSCAI tutoring should continue to be supplemented with concurrent individual tutoring. The program should not be viewed as a means of reducing attrition or improving attendance. At least in the way the program was used at these two sites, such improvements did not occur.

Effective implementation of computer technology in the tutoring session is not just a matter of making the software and hardware available. In the case of LaSCAI, expertise and training is required to identify functional reading requirements and to develop words and paragraphs for presentation in the LaSCAI program. With LaSCAI, and we suspect with any computer software, it is essential to provide explicit instructions for the use of the program. This includes instructions as to where the program fits in a complete program of instruction; instructions and explicit procedures for activities to supplement the computer based training. This support structure and training for the use of LaSCAI is essential for the successful application. Indeed, LaSCAI or any software may even have a negative impact on instruction if the materials are inadequate or the program is misapplied. For example, there was evidence that some tutors at least partially negated the instructional effectiveness of LaSCAI by providing the students with correct answers as soon as it appeared they were going to make an error.

Finally, the LaSCAI program has been debugged. There are cosmetic errors like typos in the instructions and there are more serious bugs which stop instruction and require the student to start at the beginning. A complete debugging effort is required before further dissemination occurs. Modifications and additions to the instructional program, suggested by the tutors, might be accomplished at the same time and thereby improve the overall effectiveness of LaSCAI in the volunteer tutor programs.

Sample of Initial Interviews: Literacy Volunteers

General Information

Name

Age

Present Address

Neighborhood

How long have you lived in this area?

Hometown

Computer -- Familiarity

1. Have you ever received a bill or statement prepared by a computer?

    - No--go on to the next question.

    - Yes--did you have any problems with it?

2. Do you have a money access bank card?

    - No--why not?

    - Yes--do you find it useful?

3. Have you ever played a video game or watched closely while someone else did? Does anyone in your family own an Atari or other game system?

4. Have you ever used a computer keyboard?

    - No--go on to the next question.

    - Yes--under what circumstances or for what purpose?

5. Have you ever taken part in any computer-assisted instruction? Has anyone in your family?

6. Have you ever written a letter or report using a computer or word processor?

    - No--have you seen someone else do it? Do you know what word processors do? Would you like to try it?

    - Yes--would you do it again? Did you find it helpful?

7. Who do you know that owns a computer or works with computers regularly? What do they do?

Computer -- Attitudes

1. (Show picture of home robot.) If someone offered you one of these to help you cook and clean house, would you take it? Why or why not?

2. How do you think the computers have influenced the way kids grow up?

3. Do you think the "computer revolution" will change the way we live? Why or why not? In what way? Will it alter the way people treat each other and behave?

4. What do you think is the biggest danger that the development of computer technology poses to people like yourself? What benefits does it hold for people like you?

Experience

1. Tutoring:

   a. How many hours of tutoring would you say you've done?

   b. With how many clients would you say you've worked?

2. Educational background:

   a. What is the highest certificate or degree you've received?

   b. Have you had any courses or training in teaching methods? Have you taught or do you teach in a setting other than the literacy program?

   c. How much training were you given when you enrolled as a tutor?

   d. If I asked you to assess the training you received in your training workshop, what would you say were its strongest features? What were its weakest features?

Tutoring

1. Why did you decide to become a literacy tutor?

2. What things surprised you once you started tutoring? How was it different from what you expected?

3. Why have you stayed with the tutoring program?

4. For your student(s), what do you think that learning to read better will mean? What kinds of things will they be able to read that they couldn't read previously? What kinds of things will they be able to do that they couldn't do (before)? What do you think will happen to them or for them as a result of literacy training?

5. What do you think are the component parts of reading? When a student is being taught to read, what kinds of skills is he or she acquiring? How do you teach reading skills beyond phonemes or word recognition?

Computer-Assisted Instruction

1. What do you like most about the instructional techniques you've learned from your literacy training? Are they comparable to teaching techniques you've learned previously? What do you like least about them?

2. What are the most useful or effective instructional techniques that you use? What things really seem to work? Can you give me an example of the techniques. How do you know that it works--what in the student's response tells you that it's effective?

3. Is there a kind of exercise or drill that you think is particularly effective? Can you think of a kind of exercise that you think would not work with your student? How well do you think the drills and exercises from the computer program will work for your student?

4. Do you think that the content of the material plays a significant role when you're teaching someone to read? Can you think of content areas that you would not use in teaching reading?

5. What content areas are covered by the material you use here? Can you show me some examples of those? How does your student feel about those? Why?

6. If you were designing units for LaSCAI just for your student(s), what might they be about?

7. How do you think your student will respond to the content areas the tutors have developed for the computer program. Why?

8. How do you plan to use the computer with your student?

9. How do you think your student will feel about using the computer program?

10. What do you think your student will learn about reading from the computer program? What will it offer your student that he or she might not have gotten otherwise?

11. What do you think will be the hardest part for you in learning to use the computer program for the demonstration project? What do you think will be hardest about using it with your student(s)?

Sample of Initial Interviews: Students

Demographics

Name:

1. Age: Are you between:

- 20 & 30
- 31 & 40
- 41 & 50
- 51 & 60
- over 61

2. Sex: Male ______ Female ______

3. Hometown: What town do you live in?

4. How long have you lived there?

5. What was the highest grade you attended in school?

(how long ago was that? - if possible)

6. How long have you been coming here to Laubach for tutoring?

7. Have you taken any other adult classes? What kind?

8. Have you ever been in a reading class or with a reading tutor before coming to Laubach? Yes ____ No ____

TAPE RECORD

Computers - (Part 1)

I'd like to ask you a little bit about your experience with computers.

--Have you ever played a video game or watched closely while someone else did? Does anyone in your family have an Atari or other game system?

--Have you ever used a computer keyboard?

--Do you have anyone who owns a computer or works with computers regularly? What do they do?

--Have you ever had any experience with a computer before? Tell me about it.

Reading

--What made you decide to become a student in the Laubach program? Were there any other reasons?

--How long do you think you'll stay with the program?

--What comes after that? Will you do some other kind of reading training? What do you think you're most likely to do?

--In what situations do you think reading is most important? (Get them to give a few.) Why? What makes it important there? What do you do if you don't read well there?

--What kinds of things will you be able to read when you finish Laubach?

--What effects will being able to read those things have on your life?

--Are you working now? Will being able to read better affect you at work? In what ways?

What would you say makes reading difficult? So, if you could do----you'd be able to read?

--When you first started coming to Laubach, how long did you think it would take you to learn to read. Now how long do you think it will take?

Teaching

--Is the teaching they use here at Laubach different from the teaching you had at school? In what ways?

--How do they teach you to read here? Can you describe it for me?

--What kind of practice or exercises have you found to help your reading the most?

--What kind of practice has been the least helpful?

--How is the tutor most helpful? What does the tutor do for you that would be hard for you to do on your own?

--Are there any things that you would like the tutor to do differently? What are they?

Content

--What things have you been reading about in your skill book? (or in the material that your tutor has given you?) How do you like those stories? (Articles/lessons)

--What other things would you like to read about?

--What topics/things do you think are easiest to read about? Any others?

--What things are hardest? Why?

--Would you like to read about things you do at work or at home?

Computer - (Part 2)

--What made you interested in doing this program with the computer?

--What do you think it will be like?

--In what ways do you think it will be different from the tutoring you've had here before?

--What do you think a computer's strengths for teaching will be?

--What do you think its weaknesses will be?

--How do you feel about starting the program?

Sample of Post Interviews - Literacy Volunteers

1. In our first interview, I asked you what worried you about using a computer to teach reading skills. What worries you about it now? Several people said to me earlier that they were afraid that the computer would be impersonal and cold. How do you feel about the computer's "impersonality" when you're using it to help someone learn to read?

2. In what way has the experience of using LaSCAI changed the way you feel about computers?

3. How did you feel about LaSCAI at the beginning of the demonstration project? How do you feel about it now?

4. Now I'm going to ask you a few questions about the most recent LaSCAI session you did.

--What problems did you and your student encounter?

--What kind of help did your student need with each of these parts of the program:

--The initial typing of the word.

--The completion of the definition.

--The missing-word exercise.

--The paragraph construction exercise.

--Where were you while the student was completing the unit?

--Did you use materials other than LaSCAI in that last session? What were they?

--How was that last session different from what you would usually have been doing with the student without the computer?

--Was your student afraid to use the computer alone?

--What did he or she say to you about using the computer?/

--What do you think the student learned about reading in that session?

5. Now I want to know more about the problems you and the student encountered in using the program.

--What do you remember about the first time you and the student used the program?

--What problems did you have that first time?

--In general, what kinds of help did your student need as he or she worked through the program?

6. I want to know more about how you and the student worked with the program.

--How often were you beside the student as he/she worked, even if you weren't actively helping with the units?

--How often did the student do the exercises without you there (beyond the initial setting up of the program)?

--Do you think your student could work alone (apart from the initial booting and setting up)? Why? (The probe here is for both ability and attitudinal reasons.)

7. We've found that the tutors have used the computer in all sorts of good ways and we want to know more about that.

--How many times did you meet with the student? Did you use the computer in every meeting? About how many times did you use the computer?

--When you used the computer, is that all that you did? Did you make other assignments or use other materials?

8. Now we want to see how well LaSCAI fit with the tutoring techniques you usually use.

--Does the computer do things with the student or offer kinds of exercises similar to what you usually use?

--How are the LaSCAI exercises different from what you usually do?

--How well do you think LaSCAI fits with what you usually do? Do you think it would fit? How?

9. Now for some questions on the content units you used.

--Which units did you and the student use? (Note especially the Weirton tutors who used the Laubach units and probe for differences between Laubach content and more functional content.)

--How did they fit the level at which your student was working? Were they too difficult? Too easy?

--Were they appropriate to his/her interests?

--Did your student suggest any content areas he/she would like to work with?

--Do you know of any from your talks with the student?

--Who do you think should design the LaSCAI units? If you designed new LaSCAI units yourself, how would you do them differently apart from changing the content?

10. What difference do you think the content of the materials makes when you're helping someone learn to read?

11. When a student is being taught to read, what kinds of skills is he or she acquiring? What do you remember about how you learned to read? How do you teach reading skills beyond phonetics or word recognition?

12. Here are a few questions about your student's reaction to the computer.

--Did he/she attend regularly during the demonstration project? (If no) Do you know why? Did they come more at the beginning of the project than at the end? Vice versa? Why?

--Was he/she afraid to use the computer alone? Did that change as the student used the program?

--What did he/she say to you about using the computer?

13. I want you to assess the training you received in using the computer.

--What things were most helpful?

--What things could have been added?

--What happened when you started using the computer that you didn't expect to happen?

14. We also want to know how you think your student benefitted from using the computer.

--What did he/she learn about reading?

--What did he/she get from using the computer that he/she could not have gotten any other way.

15. Now here are some questions about what your student missed or lost by working with the computer, not counting problems based on the programs' bugs.

--What were you not able to do or accomplish because your student was using the computer instead?

16. What things is LaSCAI especially good for teaching? What things is it not so good at?

17. What kind of student is most likely to benefit from using LaSCAI? Tell me more about that kind of student. Was your student that kind of student?

18. Now that you've used LaSCAI for a while, which of its present features would you like to see changed? In what way?

19. What features would you like to see added?

20. If you could give one piece of advice to a new tutor who was about to start using LaSCAI with his or her student, what would that advice be?

21. Do you think you will continue using LaSCAI after the demonstration project is over? Tell me more about that. If all the changes you suggested were made, what advantages would the program offer tutors like yourself? What would it offer volunteer literacy programs in general (probe for advantages for the student as well as the program as a whole).

Sample of Post Interviews: Students

Information on Use

1. How many times have you met with your tutor since you started using LaSCAI?

--Baltimore: did you use the computer every time you met?

--Weirton:

2. Which disk or disks did you work on? Driver's Ed? Money Management? etc.

--What disk did you like best?

--Which units did you do on those/that disk?

Now let's talk about the LAST TIME you used LaSCAI with your tutor.

3. What lessons did you do?

4. Did you spend the whole time at the computer? Is that what you usually do?

5. Did the tutor use any other material as you were working, say worksheets or other books/the Laubach books? Do you usually use other books or material when you have a lesson at the computer?

6. No I want to ask a few questions about how the tutor helped you as you were working on LaSCAI. Let's talk about the vocabulary part first.

--When the word first comes up and you have to type it, what does the tutor do?

--When you work on putting together the definition?

--Then what about the comprehension section?

--First you'd read the paragraph and then you'd have to fill in the blanks with the right words. Did the tutor usually help you there?

--How about when you had to put the sentences in the right order? What would the tutor do to help you there?

--Then you'd have to put each sentence together; did the tutor help you there?

7. The last time you met with your tutor, did she sit beside you as you worked at the computer?

--For how much of the lesson did you work on your own like that?

--Is that what you usually do in your sessions?

8. Did you or your tutor have any problems as you worked with LaSCAI?

--What kind?

--What did you do to solve them?

--How about the first couple of times you worked with LaSCAI, did you have any problems then?

Now let's talk about LaSCAI in general, not just the last time you used it, but overall.

9. Was using LaSCAI like what you expected it to be or was it different? In what way?

10. (Attitude) How did you feel the first couple of times you tried using LaSCAI?

--How do you feel about using it now? Have your feelings changed?

--How do you think your tutor felt about using LaSCAI? Do you think she felt comfortable? What makes you think so?

11. Now let's talk about the material you were reading on the disks. (Ask about individual disks if they've done more than one.)

--Did the material seem at a good level for you? Was it too hard? Too easy?

--What made it hard/easy?

--For Weirton: How did it compare with what you read in the Laubach books?

--If you could have designed the material yourself, what would you want to read about?

Computer as Teacher

12. Are there some things that LaSCAI is especially good at teaching? What?

--Are there things that LaSCAI isn't very good at teaching? What? Why?

--For Weirton: Does LaSCAI seem to teach different things from the Laubach program?

13. What do you think you learned about READING from using LaSCAI?

--For Weirton: Is that something that you don't talk about/learn about when you're using the Laubach books?

14. Now that you've used LaSCAI for a while, is there anything about it that you'd like to see changed? In what way? Is there anything you think should be added to it?

15. If all those changes were made and LaSCAI were all fixed up, how interested would you be in using it some more? Circle the number here (on this card) that matches how you feel. 1 means "not at all", 5 means "very interested", the others are in between.

16. What about if you had the chance to use LaSCAI without a tutor at all, would you (still) be interested? How interested? Mark it on the card.

17. If you could give one piece of advice to a student who was going to start using LaSCAI what would it be?

APPENDIX B

THE PROGRAM NARRATIVE STATEMENT FOR

Mary Weir Library
Weirton, West Virginia
and
Enoch Pratt Free Library
Baltimore, Maryland

MARY WEIR LIBRARY

General Description

OBJECTIVE

The Weirton Area Literacy Council wishes to make available a Community Computer Communication Center to adults and those persons over 16 years of age who are no longer in school, and who reside in the City of Weirton and Hancock and Brooke Counties. This demonstration project is aimed at people who have little or no knowledge of computers and who would like to learn, while improving reading, writing and computational skills necessary for training or employment.

PROBLEM IDENTIFICATION

We have used the 1980 Census figures, the most recent unemployment figures available through Job Services, the Report of the National Commission on Excellence in Education called A Nation at Risk: The Imperative for Education Reform*, Bureau of Labor Statistics, National Literacy Rates....to give us a rule-of-thumb estimate of the number of functional illiterates (11,101) in our Service Area. These estimates are backed up by actual examples of people currently enrolled in the Literacy program and the number of questions regarding computers, available materials, jobs and training program referrals at the public library, job services, CHANGE, Inc. and other referral agencies.

A 1980 report by the US Department of Education and the National Science Foundation stated that most Americans are moving toward "virtual scientific and technological illiteracy." The generation graduating from high school today is the first generation in American history to graduate less skilled than its parents. Estimates of functional illiterates in the United States range from 18 million to 64 million.

Just when offices are demanding more highly skilled workers to operate word-processing machines, for example, they are getting graduates who have a hard time qualifying for jobs already technologically obsolete. Some of the nations largest companies now operate remedial courses in basic math and English for Entry-level workers. The military is also involved with remedial education and training programs in such basic skills as reading, writing, spelling, and computation.

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*Twenty-three million Americans are functionally illiterate; 40% of that figure are minority and youth.

It is important to the economic recovery of this city and service area that the citizens be given the opportunity to update their basic skills so that they can be ready for job training programs as they become available. Joseph Mayernick, Director of CHANGE. Inc., a local non-profit job placement and counseling service, says "most of the laid off steelworkers applying for direction to his agency don't have the skilled talent needed for entry levels jobs. Entry level jobs are more sophisticated than they have ever been and the labor force around here does not have the skilled talent needed. We need to create jobs here and a skilled labor force."

It is estimated that by 1990 functional literacy will include computer literacy as white-collar workers in technical, managerial and clerical positions out-number blue-collar workers. Retraining blue-collar workers is one way that a skilled-labor pool needed to attract high-tech companies can be built. This will also help put displaced workers back on the job by creating a pool of technicians who will have keyboard skills, be capable of data entry functions, and have some word processing skills. Most industries and businesses will be looking for such skills. These skills are also necessary for servicing computers and related equipment.

NEED ASSESSMENT

The needs assessment has been made for the new direction of the Weirton Literacy Program to include basic computer literacy skills through input from local community groups and businesses. These groups include; Chamber of Commerce, Weirton Steel, area PIC Council, social service agencies, Job Service, Welfare Department, mental health, drug and alcohol programs, schools, rehabilitation services, and the Weirton Area Literacy Council members.

Over the last several years Weirton Steel has implemented a number of new automated business systems and has found a great need to educate their work force on basic computer operating skills. As they grow into their new company, the largest employee-owned company in the world, they are planning more of these control systems, especially within the manufacturing functions. This will require more and more of their employess to possess computer skills. Automated accounting and control systems must be implemented to keep Weirton Steel competitive in the steel industry today.

Monongahela Power Company states that computer literacy skills are required for all new clerical positions with their company.

It was recently announced that 57,000 jobs were lost in West Virginia. This means that there are many people who have to find other work. When people have low-level reading skills, they are unable to participate in a training program. It is estimated that one in five adults in West Virginia has below a 5th grade reading level-in the Weirton area this amounts to about 3,000 adults-and over 40,000 lack computer literacy skills (a conservative estimate). This does not include those individuals who have been learning English as a second language or senior citizens.

NEED ASSESSMENT - WEIRTON AREA LITERACY COUNCIL

1. 55,503 adults over age 16 according to US Census in Weirton and Hancock County. 20% of that figure, or 11,101 are residents lacking basic literacy skills, or 1 in 5 adults in the area.

These figures are based on a formula established by the Hunter/Harman Report to the Ford Foundation entitled Adult Illiteracy in the United States published by McGraw-Hill in 1979.

2. November 17, 1982, pages 1 and 3, by Charleston Daily Mail. "High School Drop Outs" - only 53% of all West Virginians hold a high school diploma, placing the state 48th in that category.

Number of adults over 25 in Weirton and Hancock County who have less than 8 years of schooling at 22.3% of population or 3,491.

50's	Many have children in college	33
	Glad to have second opportunity to get education or who have never attended school	9
Over 60	Retired, wish to cope with medicare forms, budgeting survival skills needed for limited income.	6
		178 Total

All categories include some physically or mentally disabled, hearing impaired or visually impaired.

Most have low paying, low skilled jobs if employed.

PROGRAM DESIGN

The Community Computer Communication center program will serve as a demonstration project that will train special volunteer tutors to adapt existing materials to the reading levels of individual adults and write special programs for those adults who are not functionally literate. It will also offer to those adults who have completed the basic literacy portion of the program and other adults the ability to learn basic computer language and possibly simple programming skills. Familiarity with computers is now considered a strong vocational advantage, a marketable skill.

A workshop format will be used at the Community Computer Communication Center Demonstration Project to train volunteer tutors who will develop new materials, courseware, to complement those materials already in existence. These special volunteer tutors will also develop and conduct a one hour orientation session to introduce adults and out of school secondary level vocational students to microcomputers. They will receive up to three hours of one-to-one instruction thereafter. They will also have the opportunity to work on their own with the computer. Other workshops will be scheduled as their skills develop and expertise is made available. Some of this expertise will be provided by Data Processing experts from local businesses such as Weirton Steel and the Weirton Medical Center.

The Project Coordinator will establish cooperation with local agencies and businesses that can provide linkage with students, tutors, public acceptance for the program, and relations with the Laubach Literacy Action and the West Virginia Coalition for Literacy. The West Virginia Coalition for Literacy was created by all literacy groups within West Virginia who are cooperating to achieve the common goal of 100% literacy in West Viriginia. The Project Coordinator will recruit and train Weirton Area Literacy Council members as tutors for the project. Referrals will be made by the Project Coordinator to agencies and businesses of students certified through the demonstration project.

Little or no materials exist at this time to train a person with low level reading skills to participate in a jobs-training program. These materials must be developed by the Coordinator and volunteers who will then train other volunteer tutors to train the students engaged in the demonstration project. The Council may be able to sell the product developed at the end of the demonstration year to help the program to become self supporting.

TYPES OF DATA

Types of data to be collected and maintained would include students enrolled, tutors certified, students and tutors matched, number of hours spent tutoring, use of Activity Room space with number of hours tutored, number of sessions held and people tutored in one-to-one learning, workshops conducted, number of sessions, people, hours, and hours (time) on the computers.

MONTHLY STATISTICAL REPORT

Students ________

Enrolled ________

Matched ________

Terminated ________

Tutors ________

Certified ________

Matched ________

Terminated ________

Number of Hours Spent Tutoring: ________

ACTIVITY ROOM USAGE

Tutoring Hours: _______

Number of Sessions: _______

Number of People: _______

WORKSHOPS

Basic Literacy Computer Assisted
Instruction

Hours: _______ _______

Number of Sessions: _______ _______

Number of People: _______ _______

EQUIPMENT USE

Number of Computers: _______

In House Use: _______

SOFTWARE ACQUIRED

Software Use: _______

Courseware Developed: _______

REMARKS:

EVALUATION

A test of the successful running of an adapted program will be the criteria used to evaluate a volunteer tutor for the program. Completion of a basic twelve hour LLA workshop and 40 hours of one-to-one tutoring experience will qualify a volunteer tutor to participate in the demonstration project. Volunteer tutors will be recruited from the area business community. A six hour workshop will be offered to orient tutors to basic computer skills.

Criteria used to evaluate the results and success of the project will include assessing present skill levels of students and post-testing of skill levels and the individual's ability to take tests and show keyboard proficiency in order to qualify for training programs or job placement. The project will take functional illiterates and bring them up to 9th grade or better reading level which is the minimum needed to understand written safety instruction. Workshops and courseware would also include behavioral skills for success in the work place, such as getting along well with peers and bosses, arriving on time, dressing neatly, and taking criticism without growing angry or frustrated.

PROGRAM CONTINUATION

The Weirton Area Literacy Council along with the Project Coordinator will work to develop new sources of local income and support for the Demonstration Project. The Weirton Area Literacy Council will be the fund raising organization for the Community Computer Communication Center and will be responsible for the continuation of the center.

At the end of the demonstration year the program will continue. It will become self-supporting by establishing costs for time used on the comptuer and for paper used for print-outs, as well as selling the materials developed during the project.

COMMUNITY AND PRIVATE SECTOR INVOLVEMENT

The Chamber of Commerce plans and Weirton Steel's involvement in the advisory committee demonstrates evidence of private sector involvement and corporate community leadership. They will continue to participate on the Advisory Council for the ARC project of the Weirton Area Literacy Council. Robert J. Barnabei, Director-Application Systems at Weirton Steel, has offered his services and assistance to the project, as has Grace Householder, Director of EDP at Weirton Medical Center. We will also ask the Data Processing units of area businesses to furnish the project with surplus paper for the printers for our projects. The possibility of City and Chamber working together to establish a Business and Technology Center in order to "grow their own high-tech companies", or incubator business development, is in the planning stage. Here too, there will be a link between the business community, the city government and public agencies. The ability to retrain displaced workers for high-technology jobs would complement this effort. Also the letters from local business people and agencies show evidence of private-sector concern for the development of basic computer literacy skills. The Weirton Area Literacy Council is made up of representatives from the different social service agencies, business groups, the tutors and students involved in the program, the City Library Director, Literacy Coordinator and other interested individuals from the community.

SUMMARY

The entire community is aware that unemployment is a large problem in Weirton and Hancock and Brooke Counties. The extent of adult illiteracy is a contributing factor to employability. Computer literacy is a marketable skill. In order to be computer literate you must first have basic reading writing and computational skills. One can use computer courseware developed through this demonstration project to acquire these marketable skills.

We felt that the Community Computer Communication Center will be an outstanding demonstration program of the West Virginia Appalachian development plan as a Human Resource Project.

Scope of Service for the Weirton Area Community Computer Communication Center.

A. Major Components of Project Objectives

1. STAFFING - Hire a program coordinator who will become a Laubach Literacy Action certified tutor trainer, with ability to work with adult groups, who has knowledge of the adult learning process and related experience in the use of micro-computers in teaching. The ability to

maintain good communication between all organizations will be a needed skill. The program coordinator will select a project assistant who will furnish clerical and Laubach Literacy Action tutor training assistance skills to the project.

2. ADVISORY COMMITTEE - The project coordinator will form an Advisory Committee for the Community Computer Communication Center Demonstration Project which will consist of members of the Weirton Area Literacy Council, City of Weirton, Chamber of COmmerce and area industries, including the local PIC Council. The Advisory Committee will be responsible for advising business and industry of the program and ensuring support for it. They will also advise the Council on employment openings and opportunities to enter into training programs for project participants. Included on the committee will be representatives of the local area with expertise in the field of data processing and systems analysis.

3. EQUIPMENT - Identification by coordinator and experts from the advisory committee on necessary software and hardware for the project. Ordering software and hardware.

4. ORGANIZATION - Coordinator will prepare and organize materials for tutor training and student initiation in micro-computers and their use. This will involve the selection of tutors and students, evaluation of tutors (volunteers) and students and training tutors to train students and matching tutors and students.

5. IMPLEMENTATION

a. Recruitment

The tutors will be recruited from those who have been through the basic literacy workshop and have tutored for 40 hours, and are interested in working with their students in computer literacy.

The students will be those who have completed two levels of basic literacy instruction.

b. Tutor Training

The basic 12 hour LLA workshop for literacy tutors. On completion of 40 hours of one-to-one tutoring a 6 hour workshop will be offered to the tutor on basic computer skills. This workshop will consist of information on operating the computer, computer language and capability, using the software and developing the courseware to fit the student's needs. This workshop will be given by the program coordinator.

c. Student Training

The student will have 1 hour of orientation given by the tutor to introduce him/her to the use of micro-computers and up to three hours a week of instruction thereafter. Students will also have the opportunity to work on their own with the computer. Other workshops will be scheduled as skills develop.

6. EVALUATION - Students will be evaluated before and after the program. An assessment of skills on completion of the program will be done by testing the student's ability to take aptitude and other tests for ability to enter training programs; also assessment of student's ability to develop courseware with the tutor, to meet their needs in both basic literacy and employability skills. Those students will have the opportunity to develop up to or beyond the 9th grade reading level, the level necessary to understand written safety instructions.

7. TASKS OF PARTICIPANTS

a. State Agencies

1. Referrals into and out of the project

a) Job Service
b) Vocational Rehabilitation
c) West Virginia Northern Community College Weirton Campus

b. Local Agencies

1. Advisory - BHJ Planning and Developing Council, City of Weirton, CHANGE Inc., Chamber of Commerce, West Virginia Northern Community College, Weirton Steel (Systems Analyst), and Weirton Medical Center (Data Processing); Oak Glen High School (teacher working with computers and special education students), PIC Council.

8. PAST ASSIGNMENTS OF PARTICIPANTS

Tutors will have completed 40 hours of one-to-one tutoring.

Coordinator will be trained in the Laubach method of the one-to-one tutoring.

The former coordinator was participating in an Employment Skills Project in which materials are being developed for the low level reader. She was co-operating with an employment counselor and tutors from the Weirton Area Literacy Council to produce a training program for employment preparation. People have been referred to this by the State Employment Office through Job Service and by CHANGE Inc., a private employment agency created by the Ministerial Association of Weirton. The employment skills project referrals will be made back to these agencies.

TIME SCHEDULE March 1, 1984 - February 28, 1985

Phase 1	March-April	Hire Program Coordinator, begin staffing and recruiting. Form Advisory Council, select and order equipment. Prepare and organize materials for training tutors and students for initiation into microcomputers and their use; begin selection of tutors and students.

Phase 2	(Ongoing) April-May	Evaluation of students pre-testing Quarterly report.
	May-February	IMPLEMENTATION. Train tutors and hold first workshops for tutors trained, begin matching tutors and students for minimum of 80 hours. 80 hours students hands on equipment use and other related workshops as skills are developed (some word processing and data entry skills).
	May 5	Monthly Statistical Report Filed
Phase 3	June 5	Monthly Statistical Report Filed
	July 5	Monthly Statistical Report Filed
Phase 4	August 5	Monthly Statistical Report Filed
	August 17	Quarterly Report - Program Evaluation
	September 5	Monthly Statistical Report Filed
Phase 5	November 5	Quarterly Report - Program Evaluation Begin post-testing of students Monthly Statistical Report Filed
	January 5	Monthly Statistical Report Filed
	January-February	Referrals of students of industry and other educational or training programs.
	February 5	Monthly Statistical Report Filed
	February 15	Quarterly Report - Program Evaluation
	February 15-28	Final Overall Program Evaluation

ENOCH PRATT FREE LIBRARY

Program Design

The computer-based instruction demonstration project will be incorporated into the Reading Resource Center instructional program as a supplemental technique for reading improvement Lessons taught on the computer will be reinforced by the usual techniques employed at the Center. Special clients will be scheduled to come in four times per week. Two sessions will involve the computer-based instruction and two the reinforcement techniques. The project is expected to run from 8-12 weeks providing from 32-48 hours of instruction per client. All instruction will take place at the Pimlico site.

Client

The clients recruited to participate will be reading on the 4th - 7th grade level, not currently enrolled in school, and over sixteen years old. Participants will be selected from among those who have as their objective to be able to read and interpret certain particular types of information. Priority will be given to those who are already R.R.C. clients. Fifteen to twenty participants will be recruited.

Management

The coordinator and the adult teacher will manage the project. However, all staff members will be trained to conduct sessions so that substitutes or "back-up" for regular managers will be readily available.

Evaluation

The evaluation mechanism has been established by the US Army and is already in place.

APPENCIX C

THE LANGUAGE SKILLS COMPUTER ASSISTED INSTRUCTION PACKET

(LaSCAI)

Navy Personnel Research and Development Center

INTRODUCTION

The Language Skills Computer Assisted Instruction Packet (LaSCAI) is designed as an instructional tool to improve basic vocabulary, reading and comprehension skills. While improving these basic skills, it teaches the specific vocabulary and content of the reading material it employs.

LaSCAI was developed for use on the Apple II Plus personal computer equipped with a 16K language card, 80 column Videx board and two single sided-single density disk drives. The Apple II Plus version can be used on a standard Apple IIe personal computer equipped with a 16K language card, 80 column Videx board and two single sided-single density disk drives. It can also be implemented on the IBM personal computer with 16K memory and two double sided-double density disk drives.

The LaSCAI packet consists of an Instructional program, an Authoring program, an Instructor Utility program, a Formatter Utility, a demonstration chapter, and a user's manual. There is a section in the user's manual that gives detailed descriptions and instructions for each of the programs. The manual assumes that the reader is familiar with the terms and information that are explained in the glossary. There is also a section concerning floppy disks. To attain a complete understanding of the packet the entire manual should be read carefully before any work is attempted.

The LaSCAI instructional program performs various exercises on a dictionary of words and a set of related paragraphs to improve and teach:

- spelling
- literal word definitions and usage
- sentence structure and content
- comprehension and paragraph flow

The instructional program is divided into three modules which, unless otherwise specified, are repeated in a cycle. The Vocabulary Module employs two exercises dealing with the spelling and meaning of the vocabulary words. Review tests are given periodically to test the student on the vocabulary words previously learned. There are also Special reviews on the words with which the student had difficulty.

The Comprehension Module performs three reading and comprehension exercises on the paragraphs in the database. These exercises are: fill in the blank, reorder the sentences in the paragraph, and recreate the sentence from phrases.

The last module administers a test on all the vocabulary words learned in the unit just studied.

The modules use the paragraphs and the dictionary of words, definitions and context sentences previously developed with the aid of the LaSCAI Authoring Utility.

The program can be made to run either the vocabulary module or the comprehension module rather than both. The module chosen will be repeated until the database is exhausted. If the vacabulary module is chosen, it will trade off with the unit test module (as it normally would). The comprehension module will not. The unit test module can not be done by itself.

A complete record of the student's performance is kept on the STUDENT disk and can be displayed with the Instructor Utility. For incentive student's scores are based on an imaginary money system. Students are given a set amount of money for certain groups of exercises. Money is then subtracted from this amount for the errors they make during the exercises.

STEPPING THROUGH THE PROGRAM

STARTING UP THE PROGRAM

Boot up the computer with the STUDENT disk. If properly booted the main banner will appear. The student will then be asked to insert the proper chapter into the number two disk drive. If an incorrect disk is inserted or if the computer has any trouble with the disk an error message will be printed with appropriate instructions.

Next the program asks if both the vocabulary and comprehension modules are desired. If answered with a no then it will ask on which one the student wishes to work. Once the choice is made the program will only do that module. The only way to change this is to clear the student file from the STUDENT disk with the Instructor Utility and start again.

For first time students, the program will ask them to type in their first name followed by return and then their last name followed by return (note that the names are asked for on two separate lines). Care should be taken in typing this correctly since this is used on the unit summaries to identify the student. If some other method identification is desired, such as an identification number, this can also be done. The computer will accept any string of thirty letters or numbers as the first or last name. Therefore, students could be instructed to respond with whatever is desired.

If the STUDENT disk being used has already been used by a student (and the file hasn't been cleared), the program will present the name of the student who used the disk and ask if the same student is presently trying to use it. This is to avoid confusion should the disks be mixed up. If this is not the present student's disk, he will be instructed to call the instructor and the program will stop.

For first time students the program will now continue with the vocabulary module, unless only comprehension was chosen. For returning students the program will continue from the location where they previously stopped.

VOCABULARY MODULE

The vocabulary module has four different exercises or tests as described below. The student starts with thirty-five dollars for each vocabulary word. Money is subtracted from the thirty-five dollars for errors made during the spelling and definition exercises. The money left is then added to the student's total for the unit. Penalties for the Review Test and Special Review are subtracted from the student's accumulated score for the unit. _The penalty for each error made during an exercise appears after the description of the exercise in parenthesis.

1. Spelling

The word to be studied and a context sentence (optional) for it are displayed for study. The word can be displayed in one or two different languages by pressing 1 and/or 2 then return (optional-this must be in the database and the program will prompt for the 1 or 2). The student is then asked to type the word while it is still on the screen (two dollar penalty for incorrect spelling). The student is then asked to type the word again, but this time the word will disappear as soon as the student starts typing (four dollar penalty for incorrect spelling).

2. Definition Exercise

The word and its meaning will appear on the screen for study. Next the definition is broken into nine or less words or phrases and will randomly be placed in a matrix of selections on the screen. If there are less than nine words in the definition, distractor words will be used to fill the empty location. The student must select the proper sequence of phrases to recreate the exact definition. The definition will appear at the top of the screen, phrase by phrase, as the student makes the correct selections. Students will be allowed to interchange words around "and" and "or" (six dollar penalty for incorrect reconstructions; after every two errors the definition will be redisplayed and the student will lose an additional two dollars.)

3. Review Test

Four of the words the student has studied in this chapter will appear in a column along with a matrix of definitions for these words plus one distractor definition. The student must match each word to the correct definition (ten dollar penalty for incorrect matching).

4. Special Review

If the student received less than twenty-one dollars for any word in this unit he will have to redo the spelling and definition exercises for the word (no penalty for spelling errors; ten dollars penalty for definition errors).

COMPREHENSION MODULE

The comprehension module has four exercises as described below. Students start with one hundred dollars for each paragraph. Money is subtracted from the one hundred dollars for errors made in each of the exercises. The money remaining is added to the student's total for the unit. Unlike the vocabulary module where the student must redo exercises when an error is made, in this module the correct answer is shown and the exercise continues from there.

1. Display Paragraph

This simply displays the paragraph for the student to read and study. There is no time limit.

2. Cloze Exercise

This is a fill-in-the-blank exercise that is done on each sentence in the paragraph. A word is randomly deleted from the sentence and replaced with a blank (______). This sentence, along with a matrix of words, appears on the screen. The student must choose the word that best fills in the blank (five dollar penalty for an incorrect selection).

3. Order Exercise

The first sentence of the paragraph appears on the screen. The student must then reconstruct the paragraph, choosing from a matrix of correct and distractor sentences (three dollar penalty).

4. Generate Exercise

This is a sentence recreation exercise that uses each sentence in the paragraph. The sentence is broken into six phrases. The first phrase of the sentence is displayed along with a matrix of correct and distractor phrases. The student must recreate the sentence (two dollar penalty).

UNIT TEST MODULE

The unit is completed with a test over the ten vocabulary words. The word is displayed along with a matrix of four definitions. The student must pick the correct definition for the word.

UNIT SUMMARY

The unit summary is a brief display of the student's achievements on the unit just studied. The summary is equivalent to the summary the instructor utility gives for the student format. For further details please refer to the description in the Instructor Utility section of this manual.

LEAVING THE PROGRAM

Unfortunately, the student cannot just turn off the computer when he wishes to stop working with the LaSCAI Instructional program. To maintain accurate records of the student's scores, the program must be stopped in a certain manner. The signal to the computer that it is time to stop is Control C. This can be done any time the program asks the student for a response or answer. The program will then update the student's file with the new scores, etc. By following these instructions it is possible to complete part of a chapter, leave and return later to the same location that was left. (Note- the student will never return to the middle of an exercise, that is if he is on the third sentence of the cloze exercise when he leaves he will have to redo the first two sentences again. However, the test scores will still be accurate.) If the student does not leave properly, all is not lost, but a little may be. He may have to return to an earlier location and his scores for that unit may not be completely accurate.

INSTRUCTOR UTILITY PROGRAM

INTRODUCTION

The Instructor Utility program acts as a friendly interface between the computer and the naive user so that instructors need not be familiar with computer or UCSD Pascal terms or usage. Its purpose is to display the student scores in usable formats and to perform a few necessary housekeeping jobs on the diskettes. It is divided into two modules as follows.

Unit Summary Module

The Instructional program stores the student's test scores on the Student disk in what is termed the "student files." The Instructor Utility allows the instructor to display this information either on a printer (hard copy) or simply on the computer screen. The information is displayed in units corresponding to those in the Chapters the student has worked on. One units worth of information is a Unit Summary. The program allows selection of the units for which Unit Summaries are desired. The unit summaries can be displayed in either of two formats:

1. The Instructor format is a detailed display of the student's scores on the various tests. It can be used for a detailed analysis of the student's ability.

2. The Student format is a brief report of the overall scores, the words the student needs to study and those he did well on. It is intended for student use as a study guide and for personal evaluation. Note: Please see the unit summary samples for further details.

Disk Upkeep Module

This module allows you to remove the student files from the student disk so that the disk can be used for a new student or a different independent chapter.

STEPPING THROUGH THE PROGRAM

STARTING UP THE PROGRAM

Boot up the computer with the Instructor Utility disk. The main banners will appear. The modules of this utility are:

- Set Format Module
- Unit Summary Module
- Disk Upkeep Module
- Quit the Instructor Utility

The program will automatically move into the Set Format Module. When complete the above matrix will appear and the desired module can then be chosen.

SET FORMAT MODULE

Set Format Module must be the first selection after the machine is booted. This will be done automatically. Set Format will ask a few questions that must be answered accurately by a person with the proper instructions. The answers given will be used until Set Options is entered again. Set Options requires a password to be typed into the computer correctly before allowing entry into the module. In this way the instructor can set the options and students can then print their own summaries as needed. The password is "SET FORMAT". The following questions are asked:

1. What is today's DATE? Be sure and type the date in the proper format. What you type in will appear on the unit summaries.

2. Do you wish to have the student summaries displayed on the printer or screen? If you have a printer properly connected to your computer and you wish to have the unit summaries printed choose printer. Otherwise, choose the screen.

3. How many lines are there on your printer's paper? This question will only be asked if you have chosen the printer in question two. In order to keep the unit summaries centered on the page the program must know how many lines are on the page. Normally, 8 1/2 by 11 inch paper has 66 lines, but you may have to experiment depending on your printer.

4. What is the number of units in each chapter? This should be marked on the chapter disks. If it isn't, we suggest you mark them to avoid confusion. All the chapters in a book, except the last, must contain the same number of units. For independent chapters just put the number of units in the particular chapter being used. Remember, the units in independent chapters are numbered from one to a maximum of ten. Problems will arise with the program if this number is incorrect. Once this number is set only independent chapters or books with this number of units per chapter can be used with the printer program. If your students are using chapters of varying lengths, set format must be reentered and this number changed for each set of different length chapters.

5. Do you want the instructor format? Y(es) will give the unit summaries in the instructor format, N(o) gives the student format.

UNIT SUMMARY MODULE

This module requires the student's disk, the chapter disk he worked on and the range of units to be displayed. The program will ask for these as it needs them. It will then display the summaries. Please note the following. The program will show the number of units the student has completed. (Summaries cannot be obtained for incomplete units). It will then ask for the first and last unit for which a summary is requested. In order to have several consecutive unit summaries displayed respond to "first unit" with the number of the first unit you wish to have summarized and to "last unit" with the last unit you want summarized. (That is, if the student has completed units 1 through 7 and you want to see his scores for units, 5, 6, and 7 then "first unit" is 5 and "last unit" is 7). To display just one unit type that same number for both "first" and "last unit". An error message will be displayed for the following:

1. The number typed in for "last unit" is less that typed for "first unit"

2. The number typed in for "last unit" is on a different chapter disk than the number typed in for "first unit"

3. The student has not completed all the units from "first unit" to "last unit". In each case, the program will then prompt for correct responses.

Disk Upkeep Module

This module can only be entered with the proper password. The password is "DISK UPKEEP". Once again, this is to keep student from playing with the program. For the present this module only has one option, that is to clear the STUDENT disk of student files. You will be asked if you really want to remove the student files for the student whose disk you inserted into the number two disk drive. You will have to type the full words, either "YES" or "NO", in capital letters as your response. Once the disk is cleared it is cleared forever.

AUTHORING UTILITY PROGRAM

INTRODUCTION

The Instructional program uses a database that must be developed for the course and entered into the computer. The database consists of a dictionary of words definitions, context sentences (this is optional), and one or two foreign language translations (also optional). It also contains a set of paragraphs using the words. The Authoring Utility acts as a friendly interface between the course developers and the computer to create the database used by the LaSCAI Instructional program.

The Authoring Utility consists of two modules, the Dictionary Create module and the Paragraph Create module. These modules accept information from the user and store it on the chapter diskettes so that the Instructional program can access it. There are certain restrictions that must be adhered to when creating the database that the Authoring program is designed to check for. There are also some general suggestions that should be considered before developing a database for use with the Instructional program. These restrictions and suggestions will be described in the sections to follow. When developing your database, be sure and take into account how it will be taught and displayed with the Instructional program.

The Authoring Utility uses several different files which will be put on the chapter disk the first time it is used. The files are the Dictionary, the Paragraph files, Data Info and Alpha List. It is not necessary that you understand what these files are, or how they are used, but you should know that they must be on the disk in order to work on a dictionary. Whenever backups of a chapter are made all of the files must be transferred. The first time a chapter disk is used, all of the files must be transferred. Therefore, just because the files appear on the disk does not mean that they are actually filled in with words or paragraphs. The authoring program will always tell what is actually on the disk.

Dictionary Create Module

The dictionary create module allows the user to create new dictionaries or modify existing ones. This module can display the words in the dictionary on the screen or print them on a printer either alphabetically or in the order they are tested.

The dictionary consists of the words, their definitions, and optionally a context sentence using the word, and the word in one or two different languages. The entire dictionary will be consistent with the decision to use or not use either context sentences or different languages. Also, the entire dictionary must use the same languages.

1. The Word

The word can be any string of up to 30 characters. Upper or lower case can be used. The Instructional program will always display the word in capital letters.

2. The Definition

The definition can be any string of up to 140 characters. Lower case is advised since it looks better with the instructional program, but the program will not change the case of any of the letters in the definition. There can be a maximum of eighteen words in the definition and no word can be longer than 20 characters. It is suggested that definitions be clear and concise. This allows the student to study the meaning of the word rather than trying to memorize the exact order of a complex string of words. The definition should be in phrase form without periods or capitalization.

3. The Context Sentence

Although this section is optional it is highly recommended. The context sentence can be any string of up to 160 characters. The program will put the vocabulary word into upper case, but everything else should be typed in the case appropriate for a proper sentence. The sentence should be a clear example of the usage of the word.

4. The Word in Foreign Languages

This section is optional. The vocabulary word can be displayed in one or two other languages when the context sentence is displayed. The word in a foreign language can be any string of up to 30 characters. Either case can be used, but the program will convert it to upper case.

Paragraph Create Module

The paragraph create module allows the user to create new paragraphs or to modify existing ones. It can also print the paragraphs from a chapter on a printer if it is properly connected.

There are two paragraphs for each unit of instruction. One of the purposes of the paragraphs is to demonstrate correct usage of the vocabulary words. Therefore, the two paragraphs for a unit should use the ten vacabulary words in that unit. The following restrictions must be followed:

1. two to five sentences per paragraph (preferably more than three)
2. one to fifty words per sentence (preferably more than six)
3. one to twenty-four letters per word

STEPPING THROUGH THE PROGRAM

STARTING UP THE PROGRAM

After the main banner, you will be asked to insert the chapter disk that you wish to create on or make modifications to into the number two disk drive. Once you insert the disk and press return DO NOT remove it until you are told to remove it, insert another disk or you quit the program. There are a few restrictions regarding the chapter disk used to create or modify the database. First, when creating a new database a blank, formatted disk must be used. Second, the files created by the authoring program should be the only ones on a chapter disk. Never use the disk for storage or other purposes! Third, when making modifications to a database the DAT INFO file and the ALPHA LIST file must be on the disk. These files are created by the Authoring program when the database is first created and if they are not on the disk (i.e., somehow they got lost or damaged) the program will ask you the necessary questions so that it can recreate them. This is explained in more detail later. Next, a matrix of selections will appear with the options for the authoring program. If you wish to work on the dictionary, select the Dictionary Create module. Likewise, select the Paragraph Create module for work on paragraphs. If you want to end your authoring session, select quit.

The program will now tell you which authoring files on the disk contain information. The following list describes what you can do depending on the files it tells you.

1. A blank disk--no files on the disk.

You may create a dictionary, paragraphs or both. At this time the computer will take about two minutes to arrange the new disk.

2. A dictionary, Data Info file, Alpha List file.

You may modify the existing dictionary, or create paragraphs.

3. Paragraphs, Data Info file.

You may create a dictionary or modify the paragraphs on the disk.

4. A dictionary, paragraphs, Data Info, Alpha List.

You may modify the dictionary or paragraphs.

5. A dictionary or paragraphs without the Data Info file.

Until a new Data Info file is made you cannot do anything with this chapter. The program will automatically ask the necessary questions and make a new file.

6. A dictionary without the Alpha List file.

Until a new Alpha List file is made you cannot do anything with the dictionary. The program will automatically make a new file.

If this is a new chapter or the Data Info file is missing the computer will ask you a few questions. It is very important that these questions be answered correctly for the database you are going to create or the one existing on the disk. You will be asked the bookname, the chapter number, and how many chapters there are in the book. If there is a dictionary on the disk with different languages, it will show examples of the languages and will then ask you the language they are in.

If all goes well, you will now go into the module you selected. When you quit the module, all of the above will be repeated. This is the only way you can change to a different chapter disk! Never change disks during a module.

DICTIONARY CREATE MODULE

There are several options in this module. If the chapter disk you are using does not contain a dictionary, this module will automatically go into the create option. When you are done creating the dictionary, a matrix of the other options of this module will appear. If there was a dictionary on the disk, a matrix of selections of all the activities this module is capable of (except create) will appear. Simply choose the option that corresponds with the work needed. Each of the options is described below.

1. CREATE a new dictionary

This section allows the user to insert the information to create a new dictionary. The user will be asked the following questions and should appropriately.

--"Enter name of language 1 followed by CNTL C. (cntr c for none)" - If the foreign language option is desired, answer with the name of the language you wish to use. Otherwise, type cntr c.

--"Enter name of language 2 followed by CNTL C. (cntr c for none)" - This will only appear if a first language was entered. If two languages are desired, type the second one here. Otherwise, type cntr c.

--"Do you wish to enter context sentences?" Type Y if you want to include context sentences in this dictionary. Otherwise, type N.

--"Confirm above entries?" - Type Y if the answers to the above are what you really want otherwise type N. If you type N you will be prompted for correct answers.

Now it is time to insert the dictionary. Be sure and enter the words in the order you wish them to be tested, since there is not an easy way to rearrange the word order later. The program will prompt the user for the information needed for each word. Since the editing process can be time consuming we suggest care be taken at this stage to avoid wasted time later making modifications.

For example, the program will prompt-

```
WORD

__________________________
```

There is an underscore(_) for every letter allowed for this piece of information. Type in the information. Corrections can be made as you go along using the appropriate keys for backing up. The program will not allow you to break any of the restrictions. If you do, an error message will appear and the incorrect information will be erased. To end your insertion press CNTR C. This will save the information you have just typed. After inserting the information, the user will be asked to confirm it. If YES the information for that word will be saved. Otherwise, it will be erased and forgotten. Next the user is asked if he wishes to continue. If YES the user will be prompted for information on the next word, otherwise, the program will leave the create option.

2. MODIFY an existing dictionary

The modify section acts as an editor to allow the user to change the information in the dictionary; i.e., spelling errors, etc. The user can choose one of three different ways to get to the word to be modified:

o Stepping through the dictionary (each word in the dictionary will be presented in order and you choose the ones you wish to change).

o The number of the word (you give the numerical location of the word in the dictionary).

o. The word itself (you type in the actual word you want to change).

The user chooses the method he wishes to use from a matrix of selections. If either the second or third method is chosen the appropriate information will be requested (i.e., the number of the word or the word). You will be asked if you really want to make changes to the word. Now it is time to make the actual modifications. This works just like the create section except that the old information will appear. If you wish to change it, simply back up and make the changes. Press CNTR C when you are done. If you don't want to make any changes on a particular part simply type CNTR C.

3. APPEND to an existing dictionary

The append section works exactly like the create section except your new words will be added to the end of the dictionary already on the chapter disk. Of course, you must follow the original format of the dictionary. You will not be allowed to go beyond the 100 word maximum.

4. INSERT a word into a dictionary

The insert section allows a new vocabulary word to be inserted between two other words already in the dictionary (or before the first word). Unfortunately, it can be a time consuming process. You will be given the same options as in the Modify section for finding the word you want to insert your new word before. Please note that now you are choosing the word that you want to put a new word before rather than the one you actually want to change. Your new word will now precede the word you choose. The information for the new word will then be requested as in the Create section. If the word you wished to insert before was the first word, then your new word will become the first word in the dictionary and all the other words will be moved back one. In any other situation, your new word will be put in the location you request and the word it was inserted before (and those following) will be moved back one. You will not be allowed to insert a word into a dictionary) that already has 100 words in it.

5. DELETE a word from a dictionary

The delete section allows a vocabulary word to be deleted from the dictionary. This can also be a time consuming process. You can designate the word you wish to delete by the same methods as in the modify option except here you are choosing the actual word you wish to delete. The word will then be displayed and the program will ask if you really want it deleted. Once deleted it is gone forever. All the words behind it in the dictionary will be moved up one.

6. PRINT OUT the dictionary

This section allows the user to display the dictionary on the printer or the screen in one of two different formats either an alphabetical listing or a listing of the words in the order they are tested. The computer must be properly connected to a printer if a print out is desired. Carefully follow the instructions for lining up the page of paper. The program will then display all the information in the dictionary in the format you choose.

7. QUIT the dictionary create module

This allows the user to leave the Dictionary Create module and continue with another module of the authoring utility.

Paragraph Create Module

If the chapter disk you are using does not contain any paragraphs, the program will automatically go into the Create mode. If there are paragraphs on the disk, a matrix of selections with the options for this module (except Create) will appear. Simply choose the selection that corresponds with the work needed. Each of the options are explained in detailed below.

1. CREATE a new chapter of paragraphs

This section enables the user to create a new chapter of paragraphs. The user will be prompted for each sentence and the paragraph will appear on the bottom of the screen as it is created. When finished with a sentence, terminate it with '.','!', or '?'. After the last sentence has been entered, type an asterisk (*).

2. APPPEND more paragraphs

Append allows more paragraphs to be added after the ones already on the disk. Only 20 paragraphs will be allowed on the disk.

3. MODIFY an existing paragraph

Modify allows the user to change the contents of an existing paragraph. It first asks for the number of the paragraph to be modified. If a RETURN is entered with no number, then the MODIFY option is terminated. The chosen paragraph is displayed on the screen one sentence at a time, and the user is asked whether it is okay. If not, then the user may retype the sentence. Although one cannot insert a sentence between existing ones, you can append sentences to the end of the paragraph, as long as the total number of sentences does not exceed 5.

4. REPLACE an existing paragraph

The user is first asked for the number of the paragraph that they wish to REPLACE. It is displayed on the screen, and the user is asked to confirm that this is the paragraph to be replaced. REPLACE will be terminated by a negative response. The new paragraph is then typed in.

5. DELETE a paragraph

This option will remove a paragraph from a chapter and then renumber the remaining paragraphs into consecutive order. The user is asked for the number of the paragraph. If no number is entered, then the DELETE is terminated. The paragraph to be deleted will appear on the screen, and user verification is requested. After the paragraph is removed from the chapter, then the paragraphs whose numbers come after the deleted paragraph will have their numbers reduced by one, thereby filling the gap created by the DELETE command. It is advised that, if the user intends multiple deletions, that they delete the paragraph with the highest number first. This not only will save time shifting the paragraphs, but also preserves the numbers of the lower paragraphs that are still to be deleted.

6. INSERT a paragraph

INSERT allows the user to create a paragraph between or before existing ones. The user is asked for the number of the paragraph that they wish to insert. The rest of the paragraphs with equal or higher numbers will have one added to their numbers, and get shifted up. The standard paragraph prompt appears, and the user types in their new paragraph. One cannot use INSERT to append new paragraphs; they are intended for two different things. One must also remember the rule against more than 20 paragraphs on a disk.

7. PRINT the paragraphs

PRINT allows the user to display the paragraphs on the screen, or to print them on the printer. If one is sending to the screen, a RETURN must be pressed to display the next paragraph. Since the computer can send information to the printer much faster than it can be printed, the program is designed to send 3 paragraphs at a time to the printer. The user is asked to press RETURN to continue, but only after the printer has stopped.

8. QUIT

QUIT allows the user to exit the Paragraph Create Module.

THE USE AND CARE OF DISKETTES

The computer floppy disks are delicate items and should be handled accordingly. Be aware of the following:

1. Don't touch the shiny parts of the diskette with anything.

2. Always keep them in their protective sleeves when not in use.

3. Insert into the disk drives carefully and slowly with the labelled side up and with the side closest to the shiny oblong section entering the drive first.

4. Keep them from any kind of magnetic field such as TV screens or the tops of the disk drives.

5. Handle like glass-don't bend, fold, scratch, drop, etc.

6. Keep them comfortable--preferably temperatures between 50 and 125 degrees and away from direct sunlight, heaters or water.

7. NEVER open the disk drives while the red light is on. Also, don't shake or bang the drives, computer or table especially while the light is on.

8. Write on disk labels BEFORE putting them on the disk if possible. Otherewise, use felt tip pens, lightly. Place the label on the disk so that it doesn't cover the shiny parts or hang off the edges.

There are several kinds of disks that come with the LaSCAI packet. The disk label contains important information about the disk. The disk name is on the top left corner. Information about the disk is described in the center. The date the information on the disk was developed or last updated is at the bottom left (version: (date)). To avoid confusion, whenever a copy of a disk is made it should be labeled like the original. The labels are as follows:

1. STUDENT DISK

The student disk contains the LaSCAI Instructional program and the student files that store the performance scores for the student. The student files are used by the Instructor Utility program to print the unit summaries. Each student needs his own student disk. After a student has used a disk it must be cleared by the Instructor Utility program before another student can use it.

```
----------------------------------------
LaSCAI Instruction Program/     DRIVE #1
Student Disk

VERSION (date)
----------------------------------------
```

2. CHAPTER DISKS

The chapter disks contain the data to be used by the LaSCAI program. Whenever a new chapter disk is created with the Authoring Programs, it should be properly labeled. Also, when a chapter disk is updated the version date should be changed accordingly.

```
----------------------------------------
CHAPTER (chapter number)        DRIVE #2

BOOK:  (book name)
WORDS:  (the number of words the book contains)
PARAS:  (the number of paragraphs the book contains)
UNIT PER CHAPTER:  (number of units in the chapter)
(INDEPENDENT (or) DEPENDENT)

VERSION:  (date)
-----------------------------------------------------
```

3. INSTRUCTOR UTILITY DISK

```
-----------------------------------------------------
      INSTRUCTOR UTILITY                  DRIVE #1

      VERSION (date)
-----------------------------------------------------
```

4. AUTHORING UTILITY DISK

```
-----------------------------------------------------
      AUTHORING UTILITY                   DRIVE #1

      VERSION (date)
-----------------------------------------------------
```

Note: Information that can vary from disk to disk is in parenthesis.

GLOSSARY OF TERMS AND EXPLANATIONS

1. The PROGRAM - refers to the LaSCAI Instructional Program.

2. DICTIONARY - the words and definitions used by the vocabulary module of the program.

3. PARAGRAPHS - the paragraphs used by the comprehension module of the program.

4. DATA or DATABASE - the dictionaries and paragraphs used with the Instructional program.

5. The DATA is stored on diskettes through the LaSCAI Authoring program. There are various terms that are used to refer to segments or types of data. These terms are used throughout the manual and are described below.

a. UNIT - in general, a "UNIT" consists of ten words, two paragraphs, and the cycle of exercises the program performs with them. The program repeats the cycle of tests for each unit. The cycle is as follows:

1) Vocabulary Module

- spelling and definition exercises for five vocabulary words
- review test over any four words previously learned in this chapter
- spelling and definition exercises for five more vocabulary words
- another review test over any four words previously learned in this chapter
- a special review that repeats the spelling and definition exercises for any words the student did poorly on in this unit

2) Comprehension Module

- display the paragraph
- cloze exercise--fill in the blank test
- order exercise--recreate each sentence in the paragraph from phrases
- redo the above routine with another paragraph

3) Unit test

- tests each word learned in the unit

b. CHAPTER - a chapter is the amount of data stored on one diskette. A chapter can have a maximum of 100 words and twenty paragraphs. Chapters can be either DEPENDENT or INDEPENDENT. A dependent chapter is part of a sequence that makes up a BOOK (see below) and must be tested in the order of the sequence. INDEPENDENT chapters are stand alone chapters. They can be used in any other or by themselves.

c. BOOK - a book consists of the data for one class or subject. It can contain up to six dependent chapters (one chapter per disk). The chapters must be used in sequence and the student scores for the book will all be stored on the STUDENT disk. A book can also be a single independent chapter.

d. DEPENDENT CHAPTERS - a book normally contains several chapters designed to be taught in sequence. In other words, a student starts with chapter one and continues through he chapters in order. His scores for all the chapters will be stored on the same student disk. In this way, a chapter is dependent on its previous chapters since the student can not work on it unless the preceding chapters have been completed.

e. INDEPENDENT CHAPTERS - unlike dependent chapters, independent chapters do not require that any predecessors be completed first. Independent chapters can be taught in any order. With this method the student file on the STUDENT disk must be removed before another chapter at a time.

6. Matrix of Selections - the LaSCAI program uses a multiple choice format for many of their activities. The choices are arranged in a single or multiple column matrix such as:

```
(*) choice
( ) choice
( ) choice
```

An answer is specified by using the space bar to move the asterisk (*) through the matrix to the choice desired. Then hit the return key to make the selection.

7. Yes/No Questions - if the computer asks a question that requires an answer of Yes or No, simply type Y for yes or N for no.

8. CNTR C - the manual or programs will often ask the user to type CNTR C or Control C for various reasons. To do this, press the key labeled Control or CNTR. While still pressing the key, press the C key. Then release both keys. Be sure the Control key is pressed before the C key and released both keys. Be sure the Control key is pressed before the C key and released after or at the same time as the C key.

9. Boot - the computer must be booted to get it to run an LaSCAI program. The manual will say to boot a certain disk. This is done by the following. The computer should be off. Insert the disk specified into the number one disk drive and close the disk drive door. Now turn on the computer (and screen if necessary). The red light on the disk drive should turn on and it should make a whirring sound. The main banner (title) for the program being booted should appear. The whole process may take a minute or two.

DICTIONARY

1. maximum of 20 characters per word
2. maximum of 18 words per definition
3. maximum of 140 letters per definition
4. maximum of 160 characters per context sentence

PARAGRAPHS

1. maximum of 20 characters per word
2. maximum of 24 words per sentence
3. maximum of 255 letters per sentence
4. maximum of 5 sentences per paragraph

For first time students the program will now continue with the vocabulary module, unless only comprehension was chosen. For returning students the program will continue from the location where they previously stopped.